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. 2024-25

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

WALCHAND INSTITUTE OF TECHNOLOGY WIT SOLAPUR

Civil Engineering Department

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, and the profession through professional organizations, consultancy, and continuing education.

Civil Engineering
Undergraduate 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)

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 analyze 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 modeling 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 graduates in Civil Engineering Programme will be able to do-

1. Graduates will be able to survey, conduct geotechnical 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, and municipal and industrial waste treatment plants with due consideration to a 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

Walchand Institute of Technology, Solapur

Structure of S.Y. B. Tech. Civil Engineering
(W.E.F. 2024-25)
Semester III

Group	Course Code	Name of Course	Engagement Hours			Credits	FA		SA		Total
			L	T	P		ESE	OE/POE	ISE	ICA	
Programme Core Course (PCC)	CEPCC01	Fluid Mechanics and Fluid Machines	2		2	3	60	25	40	25	150
	CEPCC02	Building Construction & Design	3			3	60		40		100
	CEPCC03	Structural Mechanics-I	2			2	60		40		100
	CEPCC04	Surveying & Geomatics	2		2	3	60	25	40	25	150
Community Engagement Project (CEP)/Field Project (FP)	CECEPFP	CEP/FP			4	2				50	50
Open Elective (OE)	OE01	Open Elective I	2	1		3	60		40	25	125
Entrepreneurship/ Economics/Management Courses	EEM01	Entrepreneurship development	1	1		2				50	50
Value Education Course (VEC)	VEC01	Universal Human Values	2			2	50				50
Multidisciplinary Minor (MDM)	MDM01	Multidisciplinary Minor - I	2			2	60		40		100
		Total	**16**	**2**	**8**	**22**	**410**	**50**	**240**	**175**	**875**

Walchand Institute of Technology, Solapur

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

(W.E.F. 2024-25)

Semester IV

Group	Course Code	Name of Course	Engagement Hours			Credits	FA		SA		Total
			L	T	P		ESE	OE/ POE	ISE	ICA	
Programme Core Course (PCC)	CEPCC05	Environmental Engineering	2		2	3	60	25	40	25	150
	CEPCC06	Concrete Technology & Material Testing	2		2	3	60		40	25	125
	CEPCC07	Structural Mechanics-II	2	1		3	60		40	25	125
	CEPCC8	Building planning and Modelling	1		2	2		25		25	50
Vocational & Skill Enhancement Course (VESC)	CEVSEC03	Programming in Python	1		2	2		25		50	75
Entrepreneurship/Economics/Management Courses	CEEEM02	Principles of Management and Quantitative Technique	2			2	60		40		100
Open Elective (OE)	OE02	Open Elective II	2	1	-	3	60		40	25	125
Ability Enhancement Course (AEC)	AEC02	General Proficiency	1	1		2				50	50
Value Education Course (VEC)	VEC02	Professional Ethics	2			2			50		50
Multidisciplinary Minor (MDM)	MDM02	Multidisciplinary Minor II	1		2	2			50	25	75
		Total	**16**	**3**	**10**	**24**	**300**	**75**	**300**	**250**	**925**
Self-Learning	MASL01	Environmental Science					**50**				**50**
											975

Multidisciplinary Minor Program in Civil Engineering

Semester	Course Code	Name of Course	Engagement Hours			Credits	FA		SA		Total
			L	T	P		ESE	OE/POE	ISE	ICA	
III	CEMDCE01	Smart Buildings	2			2	60		40		100
IV	CEMDCE02	Geoinformatics	1		2	2			50	25	75
V	CEMDCE03	Environmental Impact Assessment	3			3	60		40		100
VI	CEMDCE04	Infrastructural Systems	2		2	3	60		40	25	125
VII	CEMDCE05	Disaster preparedness and planning	3	1		4	60		40	25	125
		Total	**11**	**1**	**4**	**14**	**240**		**210**	**75**	**525**

List of Open Elective Courses (Semester-III)

Course Code	Course Name
CEOE01	Managerial economics
CEOE01	Management Information Systems
CEOE01	Digital Marketing
CEOE01	Cyber laws
CEOE01	Sustainable Development
CEOE01	Renewable Energy

List of Open Elective Courses (Semester-IV)

Course Code	Course Name
CEOE02	Applied Mathematics
CEOE02	Higher Engineering Mathematics
CEOE02	Advanced Engineering Mathematics
CEOE02	Statistics & Fuzzy Logic
CEOE02	Statistics & Transform

Walchand Institute of Technology, Solapur

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

CEPCC01 FLUID MECHANICS AND FLUID MACHINES

Teaching Scheme	**Examination**
Scheme	
Lectures– 2 Hours/week, 2 Credits	**ESE** - 60 Marks
Practical – 2 Hours/week, 1 Credit	**ISE** - 40 Marks
	ICA - 25 Marks
	POE - 25 Marks

The course offers a comprehensive introduction to the principles of fluid mechanics and the design and operation of fluid machines. Students will explore fluid properties, fluid statics, and fluid dynamics, learning to analyze fluid flow in various systems. The course covers essential topics such as laminar and turbulent flow, flow through pipes, and the principles and performance of fluid machinery, including pumps, turbines, and compressors.

Course Prerequisite:

The student should also have insights of engineering physics and Mathematics.

Course Objectives:

1. To make students develop a fundamental understanding of the physical properties of fluids and their behavior under various conditions.
2. To equip students with the ability to analyze and solve problems related to fluid dynamics, including laminar and turbulent flow, boundary layers, and flow through pipes and channels.
3. To enable students to design, evaluate, and select appropriate fluid machinery such as pumps, turbines, and compressors.
4. To provide students hands-on experience and practical skills through laboratory experiments and real-world case studies.

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

1. Comprehend physical properties of fluids and relationship between them.
2. Identify and analyse the hydrostatic forces on submerged and floating bodies.
3. Analyse fluid motion with and without forces.
4. Quantify water flow through Notches & Weirs.
5. Determine head losses through pipes and solve pipe networks.
6. Explain the working of hydraulic turbines and pumps along with their performance parameters.

SECTION-I

Unit 1: Fluid Properties: No of Lectures-04

Definition of Fluid and fluid mechanics, Physical properties of fluids: Density, Specific weight, Specific volume, Relative density Cohesion, Adhesion, Viscosity- Newtonian and Non- Newtonian fluids, Classification of fluids, compressibility, Surface tension, Capillarity, Vapor pressure, Cavitation, Problems involving use of above Fluid Properties.

Unit 2: Fluid Statics: No of Lectures-06

Pascal's law, Hydrostatic Law, units and scale of pressure measurement, types of pressure, Piezometer, U-tube manometer, U-tube differential manometer, Inverted U-tubedifferential manometer; Mechanical pressure gauge – Bourdon tube, Total Pressure on vertical and inclined plane surfaces submerged in fluid, depth of Center of Pressure. Concepts of: Buoyant force, Buoyancy and Center of Buoyancy, Archimedes Principle, Metacenter and Metacentric height, Equilibrium of floating and submerged bodies.

Unit 3: Fluid Kinetics & Fluid Dynamics: No of Lectures-06

Methods of describing fluid motion, Concept of Control Volume, Streamlines, Path lines, Streak lines and Stream tubes, Types of fluid flows, Rate of flow, Continuity equation, Velocity potential and stream function, Equipotential Line, flow net.

Forces acting on fluid mass in motion, Euler's equation of motion along a streamline, Bernoulli's Theorem, Limitations and Applications, Measurement of discharge-through Venturi meter, Orifice meter and Orifice, Measurement of velocity through Pitot tube.

SECTION-II

Unit 4: Notches and Weirs: No of Lectures-04

Notches: Types of notches, Derivation of discharge equation, velocity due to approaches, Francis formula, Errors in measurements of head.

Weir: Sharp & Broad crested weirs, calibration of weirs, time required to empty the tank with notches and weirs, Ventilation of weirs, Types of nappe.

Unit 5: Flow through Pipes: No of Lectures-04

Energy Losses in pipe flow: Major and Minor Losses, Darcy Weisbach Equation, Pipes in Series and Parallel, Concept of Equivalent length and Equivalent diameter of pipe; Concept of HGL, TEL and Syphon, Water Hammer; Hardy Cross Method for solving pipe network.

Unit 6: Impact of jet, hydraulic turbines and pumps: No of Lectures-06

Force and work done due to impact of jet on stationary and moving, flat and curved surfaces using linear momentum principle, Elements of hydropower plant, Hydraulic turbines-Classification, Francis and Kaplan turbines, Draft tube, Specific speed, Design and governing of Pelton Wheel, Prediction of performance in terms of unit quantities and specific quantities, selection of turbines on the basis of head and specific speed, Classification of Hydraulic Pumps, Centrifugal Pump - Components, Working of Centrifugal pump, inlet and outlet

velocity triangles, Work done by impeller, Types of Heads and efficiencies, Concept of priming of pump, multistage pumping, operational difficulties in Centrifugal Pump, Introduction to submersible pumps and reciprocating pumps, Selection of Pumps.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

(A) Experiments for the determination of the following (Min.10):

1. pH value Measurement of pressure (Piezometer, Manometers, Pressure gauges)
2. Acidity Determination of Metacentric heights.
3. Alkalinity Verification of Bernoulli‟s Theorem
4. Chloride content Calibration of an orifice/mouthpiece.
5. Hardness Calibration of Venturi meter.
6. Turbidity Calibration of V notch and rectangular notch
7. Residual Chlorine Calibration of the broad and sharp-crested suppressed weir
8. Calibration of Ogee Weir.
9. Dissolved Oxygen Determination of loss of head in pipe flow.
10. Reynolds Experiment
11. Impact of jet
12. Study of turbines (demonstration/test)
13. Study of centrifugal pump. (demonstration/test)

Internal Continuous Assessment (ICA) submission shall consist of the journal containing

1. Above mentioned Experiments
2. Assignments on each unit based on the syllabus.

- **Text Books**

1. Fluid Mechanics -A. K. Jain-Khanna Pub., Delhi.
2. Fluid Mechanics - S. Nagrathanam Khanna Pub., Delhi.
3. Fluid Mechanics - Garde, Mirajgaonkar Nemchand and Bross., Roorkee.
4. Fluid Mechanics - R. W. Fox, P.J. Prichard, A. T. McDonold- Wiley India.
5. Fluid Mechanics - K.L. Kumar Eurasia Publishing House, Delhi.
6. Fluid Mechanics & Hydraulic Machines, SS Rattan, Khanna Publishing House

- **References**

1. Fluid Mechanics and Fluid Machines - Modi and Seth Standard Book House, Delhi.
2. Fluid Mechanics - Streeter McGraw Hill-International Book Co., Aucklard.
3. Fluid Mechanics - Munson, Young- Willy India.
4. Mechanics of Fluids - M.C. Potler, Wiggert, Ramdan- Cengage Learning
5. Elementary Fluid Mechanics - H. Rouse Toppan C. Ltd., Tokyo.
6. Fluid Mechanics – Shames McGraw Hill International Book Co.

Walchand Institute of Technology, Solapur

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

CEPCC02 BUILDING CONSTRUCTION AND DESIGN

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

This course provides a thorough introduction to the functional requirements and structures of buildings. It also covers the development of CADD skills for designing building components, creating detailed perspective view drawings, and planning and designing residential buildings with CADD to ensure compliance with building bylaws

Course Prerequisite:

The student has completed a course in the Basics of Civil Engineering and has an adept knowledge of they should possess a foundational understanding of civil engineering principles, including structural components, material properties, and construction techniques. Additionally, students should be proficient in CADD software for drafting and design purposes. This prior knowledge will ensure they are well-prepared to understand functional requirements and building structures, develop advanced CADD skills for creating detailed drawings of building components, produce accurate perspective view drawings, plan and design residential buildings and ensure compliance with relevant building bylaws.

Course Objectives:

1. To make students understand the functional requirements of building structures.
2. To make students develop CADD skills for building components.
3. To make students create detailed perspective view drawings
4. To make students plan and design residential buildings with CADD.
5. To make students ensure compliance with building bylaws.

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

1. Elucidate functional requirements of buildings and types of foundations and types of Masonry walls.
2. Draw neat drawings of different building components such as doors,windows, stairs, etc. with a suitable scale using CADD software.
3. Draw neat perspective view drawings of an object and one G+1 Residential building
4. Prepare planning and design of residential buildings using CADD software tools.
5. Plan residential and public buildings, according to the prevalent building Byelaws

SECTION-I

Unit 1: Building functional Requirements, Building Type, Foundation & Type of Masonry wall: No of Lectures-07

- 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)
- Foundation: - Importance of foundation as a 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)
- Types of Masonry and Walls: 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)

Unit 2:Doors, Windows & Staircase: No of Lectures-05

- 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 stairs, design of stairs, types of stairs, technical terms.

Unit 3:Perspective Drawing: No of Lectures-4

- 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).

SECTION-II

Unit 4: Site Selection of Building, Principles of Building Planning, Orientation and By-Laws and Dimension Relationships: No of Lectures-4

- 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 based on climate conditions, Orientations of buildings for various parts of India based on climate conditions.
- Building Planning Byelaws and Regulations as per SP-7, National Building Code of India.

- Dimensions & Space requirement with body measurements. Space design for passage between walls, service access, stairs, ramps, and elevators.

Unit 5: Planning and Design of Residential Buildings: No of Lectures-4

- Planning and functional requirements of Residential buildings: - Bungalows (Detached), Twin bungalows (Semi-Detached), Rowhouses, Ownership flats, and Apartments, Parking Area Criteria

Unit 6: Building Services: No of Lectures-6

- 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 of various Electrical points, Concept of earthing.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Sketching in a sketchbook consisting of the following 9 drawing exercises: (To Scale)

1. Lettering, Symbols, and line work.
2. Brick bonds.
3. Doors.
4. Windows.
5. Staircases.
6. Perspective drawing of the object and one G+1 Residential building (Ready plan).

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

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

b) Planning and designing of residential building (G+1) and preparing 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) Furniture layout plan
   3) Electrification layout plan
   4) Water supply and Drainage layout plan
   5) Perspective drawing of the building.

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

END SEMESTER EXAMINATION

A. Theory Examination (60 marks, 3 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.

- **Textbooks**

1. A textbook 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
9. A Course in Civil Engineering Drawing, Sikka, S.K. Kataria & Sons
10. Engineering Drawing, Dhanarajay A Jolhe, Tata McGraw Hill
11. Engineering Drawing + AutoCAD , by K.Venugopal , New Age International Publishers
12. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton, SYBEX Publishers.

Walchand Institute of Technology, Solapur

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

CEPCC03 STRUCTURAL MECHANICS- I

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ISE: 40 marks ESE: 60 marks

This course covers fundamentals of structural materials and material behavior essential for engineering design. Topics include stress-strain relations, principal stresses, shear force diagrams, bending moment diagrams, and influence line diagrams, emphasizing practical applications in engineering practice

Course Prerequisite:

The student has completed a course in Applied Mechanics. Prior knowledge of statics, mechanics of materials, and basic calculus is essential. Familiarity with concepts such as equilibrium of forces, and material properties will facilitate understanding of topics

Course Objectives:

1. In-depth understanding of the behavior of engineering materials under various loading conditions.
2. To determine principal stresses and strains and to understand and apply various failure theories
3. To provide the knowledge and skills to construct and interpret shear force and bending moment diagrams.
4. Comprehensive understanding of bending stresses and shear stresses in beams.
5. To equip students with the skills necessary to understand and construct influence line diagrams.

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

1. Understand material behavior to analyze and predict material responses in practical engineering scenarios.
2. Identify principal planes & determine principal stresses also be proficient in applying various failure theories to predict and prevent material failure in engineering applications
3. Understand and apply the relationship between load intensity, shear force, and bending moment to assess the internal forces and moments in beam structures.
4. Proficient in analyzing the distribution of bending stresses and shear stresses in beams with various cross-sectional shapes
5. Analyze and apply knowledge of influence line diagrams for determining critical values related to structural design.

SECTION-I

Unit 1: Simple stresses and strains: No of Lectures-06

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, Composite sections under axial loading: compound bars.

Unit 2: Principal stresses and strains: No of Lectures-05

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

Unit 3: Theories of elastic failures: No of Lectures-04

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

SECTION-II

Unit 4: Analysis of statically determinate beams: No of Lectures-05

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 5: Bending Stresses: No of Lectures-03

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 6: Shear stresses in beams: No of Lectures-03

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

Unit 7: Influence line diagrams: No of Lectures-04

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.

- **Textbooks**
  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

CEPCC04 SURVEYING & GEOMATICS

Teaching Scheme:
Lectures : 2 hours per week, 2 Credits
Practicals: 2 hours per week, 1 Credit

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

The salient features of this course are:
Surveying and Geomatics is an applied science and a discipline that involves an approach to the measurement, analysis, management, and display of special data, geographic data, or geographic information. In this discipline, tools and services are required to collect the integration of geographical data, which includes geomatics engineering and is also related to geospatial science. People who study Geomatics, generally pursue a career to become a Geomatics officer or researcher who is involved in designing, conducting, and managing activities that are related to surveys, geography, land development, and planning.

Course Prerequisite:
Students should have the following prerequisites
1. Engineering Mathematics
2. Basic Civil Engineering

Course Objectives:
With the successful completion of the course, the student should have the capability to:
1. Be familiar with the principals of recording accurate, orderly, complete, and logical field notes from surveying operations, whether recorded manually or with automatic data collection methods, b) Operate an automatic level to perform differential and profile leveling; properly record notes; mathematically reduce and check levelling measurements,
2. Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments. Be able to identify hazardous environments and take measures to insure one's personal and team safety,
3. Measure horizontal, vertical, and zenith angles with a total station or survey grade GNSS instruments, Use appropriate software for calculations and mapping, Operate a total station to measure distance, angles, and to calculate differences in elevation.
4. Work as a team member on a surveying party to achieve a common goal of accurate and timely project completion, Calculate, design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities.

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

1. Carry out temporary adjustments of Auto Level, Total Station, DGPS and modern surveying equipments.
2. Use the surveying instruments namely levels, total station DGPS and modern surveying equipments for surveying measurements such as horizontal/ vertical/inclined distance, reduced levels, and coordinates.
3. Use modern surveying techniques namely remote sensing, Global positioning systems, and Geographic information system for Civil Engineering applications.
4. Develop plans, draw maps, and draft reports for surveying projects of Civil Engineering work.

SECTION-I

Unit 1: Leveling instruments and applications No of Lectures - 6

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: **Modern Surveying Instruments** No of Lectures - 6

a. Laser Level and Digital level: Introduction to construction, temporary adjustments, and use.

b. Total station: Types, Construction, temporary adjustments, and working.

SECTION-II

Unit 3: **Global Positioning System (GPS)** No of Lectures-6

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., Real Time Kinematic G.P.S., Applications of G.P.S.

Unit 4: **Remote Sensing Techniques (RST)** No of Lectures – 6

a. Terrestrial and Aerial Photogrammetry: Principles, Phototheodolite, Aerial Camera. Vertical aerial Photogrammetry: Scale, Relief Displacement, flight planning

c. Unmanned Aerial Vehicle (Drone) -Introduction

d. Electromagnetic remote sensing: Electromagnetic spectrum. Energy sources and their characteristics. Atmospheric influences: Absorption, Scattering. Energy interaction with Earth Surfaces: Spectral reflectance Curve. Image Acquisition: Image resolution. Image Interpretation. Applications of Remote Sensing.

Unit 5: **Geographical Information System (GIS) and Project Survey** No of Lectures - 6

a. Geographical Information System (GIS): Information systems, spatial and nonspatial Information, geographical concept and terminology, advantages of GIS, the Basic component of GIS. Points, lines, and area features, vector and raster data, preprocessing of data, Image rectification, registration, and interpolation techniques.

b. Building Lineout and layout, Project Survey for public works

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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. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS, and Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

- **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. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.

Walchand Institute of Technology, Solapur

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

CECEPFP: COMMUNITY ENGAGEMENT PROJECT/ FIELD PROJECT

Teaching Scheme | **Examination Scheme**

Practical – 4 Hours/week, 2 Credits | **ICA -** 50 Marks

Community Engagement Project/ Field Project is an experiential learning strategy that integrates meaningful community engagement with instruction, participation, learning and community development. It applies the experience to personal and academic development. It is meant to link the community with the institutes for mutual benefit. The community will be benefited with the focused contribution of the students for the village/ local development. The institute finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Course Objectives:

1. To sensitize the students to the living conditions of the people who are around them
2. To help students to realize the harsh realities of the society
3. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
4. To make students aware of their inner strength and help them to find new /out of box solutions to the social problems
5. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections
6. To help students to initiate developmental activities in the community in coordination with public and government authorities

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Course Outcomes:

After completing this course, the student shall be able to -

1. Apply the knowledge to solve the real-world problems
2. Demonstrate complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
3. Develop interpersonal skills, particularly the ability to work well with others, and build leadership and communication skills
4. Improve social responsibility and citizenship skills
5. Develop connections with professionals and community members for learning and career opportunities

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Procedure:

- Form a group of not more than 5 students.
- A mentor/guide will be allotted for each group.
- Students should finalize a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay.

- Students may work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc. or with any NGO actively working in that habitation.
- Then, they should conduct a preliminary survey including the socio-economic conditions of the allotted habitation, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas.
- If required, a survey form based on the type of habitation (rural, urban etc.) should be prepared before visiting the habitation.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats may be aligned for the survey.
- Analysis of the collected data should be done.
- A solution should be proposed to the problem identified.

Students should prepare a report which should include following points.

- Introduction
- Primary Data obtained through survey/ field visit
- Analysis of collected data
- Proposed Solution

Students may take help from different government departments like –

- Agriculture
- Health
- Marketing and Cooperation
- Animal Husbandry
- Horticulture
- Fisheries
- Sericulture
- Revenue and Survey
- Natural Disaster Management
- Irrigation
- Law & Order
- Excise and Prohibition
- Mines and Geology
- Energy

Examples of community engagement / field projects are as below:

- Study of per capita domestic water consumption in the selected colonies in the ward
- Study and characterization of domestic waste generation in the ward
- Analysis of depot level operations data
- Study of depot level maintenance processes
- Study and mapping of open drains in the ward
- Study of availability and access of public toilets in the ward
- Study and mapping of community spaces in the ward

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

OE01A: OPEN ELECTIVE-I-MANAGERIAL ECONOMICS

Teaching Scheme	**Examination Scheme**
Practical – 2 Hours/week, 2 Credits	**ESE** - 60 Marks
Tutorial -1 Hours/week, 1 Credit	**ISE** -40 Marks
	ICA- 25 Marks

This course provides a thorough introduction to Managerial Economics, its concepts, and principles for decision-making. It also covers concepts of Theory of Demand, Production Analysis, and Cost Analysis and students will have information about different Market Structures required for managerial decision making.

Course Objectives:

1. To help students understand the basic concepts of economics and their application to managerial decision-making.
2. To ensure students grasp the Principles of Managerial Economics.
3. To teach students about the Theory of Demand.
4. To educate students on Production Analysis and Cost Analysis.
5. To inform students about different Market Structures.

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

1) Recognize the concepts of Managerial Economics.
2) Understand the principles of Managerial Economics.
3) Describe and apply the concepts of Demand in market contexts.
4) Identify and understand the concepts of Production Function and Cost Analysis.
5) Recognize and differentiate between various Market Structures.

SECTION-I

Unit 1: Managerial Economics: No of Lectures-03

- Managerial Economics: Introduction and Definition, Introduction to Economics, Concepts of Micro-Economics and Macro-Economics, Nature of Managerial Economics, Scope of Managerial Economics.

Unit 2: Principles of Managerial Economics: No of Lectures-06

- Incremental principle, Time perspective principle, Opportunity cost principle, Equi marginalism principle, Discounting principle, Marginalism principle, Concept of scarcity, Production possibility curve.

Unit 3: Theory of Demand: No of Lectures-06

- Introduction and Meaning, Definition of demand, Nature and types of demand, Determinants of Market Demand, Demand Function.

SECTION-II

Unit 4: Production Analysis: No of Lectures- 04

- Production Function: Fixed inputs and Variable inputs.
- Types of Production function: Law of variable proportions and Law of returns to scale.

Unit 5: Cost Analysis: No of Lectures-06

- Introduction of Cost and Cost Concepts: Long run Vs short-run costs, Fixed Vs variable costs, Semi fixed vs. semi-variable costs, Marginal costs, Controllable vs. non-controllable costs, Opportunity Vs outlay costs, Incremental Vs sunk costs, Out of pocket Vs book costs, Replacement cost Vs historical cost, Past Vs future costs, Separable Vs joint costs, Accounting Vs economic costs, Urgent Vs postponable costs, Escapable vs unavoidable costs.

Unit 6: Market Structure: No of Lectures-05

- Market Structures: Introduction, Definition of Market Components and Market Structure, Types of market and its introduction: Perfect Competition, Monopoly, Duopoly, Oligopoly, Monopolistic Competition.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of a minimum of six assignments based on the entire curriculum which will be assessed by faculty.

- **Text Books:**
  1) D.M. Mithani, "Managerial Economics Theory & Applications" 2017,8th Ed, Himalaya Publishing House**.**
- **Reference Books:**
  1) Mark Hirschey, "Managerial Economics – An Integrative Approach", 2008, 1st Ed. Cengage Learning.
  2) Craig H. Peterson, W. Cris Lewis &Sudhir K. Jain, Managerial Economics, 2008,4th Ed.,Pearson Education
  3) D. N. Dwivedi, "Managerial Economics", 2009,7th Ed Vikas Publishing House Pvt. Ltd
  4) Dominik Salvatore, "Managerial Economics", 2008, 6th Ed. Oxford University Press.
  5) Geethika, Piyoli Ghosh,P.R. Chaudhary "Managerial Economics", 2008, Tata McGraw Hills, New Delhi

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S.Y. B. Tech Semester-III

OE01B: Renewable Energy (Open Elective-I)

Teaching Scheme	**Examination**
Scheme	
Lectures– 2 Hours/week, 2 Credits	**ESE** - 60 marks
Practical – 1 Hours/week, 1 Credit	**ISE** -40 marks
	ICA - 25 Marks

Availability of energy is the one key area where most of the Indian industry is facing problems. In India, even today, there is short fall of energy generation. Since energy is required by every sector of economy, the growth in this sector is must if Indian economy grows in any sector. Many of the job opportunity in private as well as public sector are therefore waiting for students in this field. Hence, this course attempts to provide them basic knowledge of the various Renewable energy resources and would also acquaint them with the latest technological advances taking place in this sector.

Course Prerequisite:

The students need to have basic knowledge of Basic Mechanical Engineering.

Course Objectives:

1. To understand energy scenario, energy sources and their utilization.
2. To explore society's present needs and future energy demands.
3. To Study the principles of renewable energy conversion systems.
4. To make familiar with energy conservation methods

Course Outcomes:

At the end of this course, the student will be able to

1. Communicate the basic utilization of renewable energy sources, related power systems configurations and leading to energy conservation.
2. Identify the technologies used in harnessing Solar and Wind energy.
3. Apply the principles of the biomass and geothermal energy harnessing for suitable applications.
4. Communicate the harnessing principles of the ocean and hydrogen energy for suitable applications.

Unit 1– Renewable Energy Sources No of lectures-03

Renewable and non-renewable energy sources, strategy for meeting the future energy requirements Global and National scenarios, Prospects of renewable energy sources. India's Production and reserves, energy alternatives.

Unit 2– Solar Energy No of lectures-04

Flat plate collectors, concentrating collectors, Solar air heaters-types, solar dryers, storage of solar energy-thermal storage, solar pond, solar water heaters, solar distillation, solar still, solar cooker, solar heating & cooling of buildings.

Unit 3– Wind Energy No of lectures-04

Basic Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines.

Unit 4–Biomass Energy No of lectures-04

Biomass conversion technologies, Biogas generation plants, classification, advantages and disadvantages, constructional details, site selection, digester design consideration, filling a digester for starting, Fuel Properties of Bio-gas Plant, Utilization of Bio-gas.

Unit 5– Geothermal Energy No of lectures-04

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

Unit 6– Energy from the ocean No of lectures-04

Ocean Thermal Electric Conversion (OTEC) systems like open cycle, closed cycle, Hybrid cycle, prospects of OTEC in India. Energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages, limitation and scope of tidal energy. Wave energy and power from wave, wave energy conversion devices, advantages and disadvantages of wave energy.

Unit 7– Hydrogen Energy No of lectures-02

Introduction, Hydrogen Production methods, Hydrogen storage, hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles.

Unit 8– Energy Conservation No of lectures-03

Economic concept of Energy, Principles of Energy Conservation and energy audit, Types of energy audit, Energy conservation Approach.

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- **Internal Continuous Assessment (ICA) :**
  ICA consists of minimum 8 tutorials based on curriculum.
  Recommended tutorials:
  1. Test on Solar Flat plate Collector
  2. Test on Concentric Solar collector
  3. Study of Solar cooker
  4. Study of wind energy conversion systems
  5. Study of Biogas plants

6. Study of geothermal sources
7. Study of various Energy storage devices.
8. Study of thermal energy storage system
9. Study of phase change materials
10. Study of hydrogen systems

- **Text Books**
  1. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
  2. R.K.Rajput "Non-Conventional energy Sources and utilization". Schand Publishers.
  3. S.S. Thipse, "Non-Conventional and Renewable Energy Sources", Narosa Publishers.

- **References Books**
  1. Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
  2. Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of India Pvt. Ltd.
  3. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
  4. S. Rao & B.B.Parulekar "Energy technology Nonconventional, Renewable and conventional", Khanna Publishers.

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S.Y. B. Tech. Semester-III

OE01C: Sustainable Development (Open Elective –I)

Teaching Scheme:	**Examination Scheme:**
Lecture: 2hrs/week, 2 credits	ESE: 60 Marks
Tutorial: 1hrs/week, 1 credit	ISE: 40 Marks
	ICA: 25 Marks

Sustainable Development is an interdisciplinary field that addresses the challenges of maintaining the delicate balance between economic growth, environmental preservation, and social well-being. This course will provide a comprehensive overview of the principles, strategies, and practices essential for promoting sustainability. Through a combination of theoretical knowledge and practical applications, students will gain an understanding of how to develop solutions that contribute to a sustainable future

Course Objectives:

1. To provide a comprehensive understanding of the fundamental concepts, principles, and practices of sustainable development.
2. To explore the social, economic, and environmental dimensions of sustainability, and their interconnections.
3. To examine the application of sustainable practices in various sectors, including tourism, and the importance of corporate social responsibility (CSR) and community involvement in achieving sustainability.
4. To analyze the role of policy, governance, and international frameworks in promoting sustainable development, with a focus on the 2030 Agenda and the Sustainable Development Goals (SDGs).

Course Outcomes:

By the end of the course, the students will be able to:

1. Define sustainable development and identify its key concepts.
2. Explore the social dimension of sustainable development.
3. Apply a sustainable development approach to real-time problems.
4. Explicate sustainable development goals and targets

Unit 1: Introduction to Sustainable Development **No of Lectures-08**

Natural resources, Sustainability, Climate Change, Biodiversity, Renewable resources, Green Technology, Corporate Social Responsibility (CSR), Externalities, Pareto Efficiency, The Three Pillars of Sustainability, The birth and evolution of Sustainable Development

Unit2: The Social Dimension of Sustainable Development **No of Lectures-08**

Introduction, Sustainable Development and the Environment, Basic Economic Principles of Sustainable Development, Environmental Policy and Governance, The Role of the Enterprise in Sustainable Development: Corporate Social Responsibility,

Unit3: Sustainable Development in Various Fields **No of Lectures-08**

Cooperations and Sustainable Development, The Impact of Urban Pollution in Sustainability – the Role of Citizens, Creating motives and tools in order to enable citizens to become "Smart Citizens": A "socially-oriented" bottom-up approach towards sustainability

Unit4: Transforming our world: the 2030 Agenda for Sustainable Development

Introduction, Declaration, Sustainable Development Goals and Targets (Goals 1 to 17) **No of Lectures-08**

Internal Continuous Assessment (ICA):

ICA consists of a minimum of six tutorials based on the above syllabus.

References:

1. SUSTAINABILITY: E-BOOK FOR STUDENTS by Bogucki Wydawnictwo Naukowe Poznań 2023
2. Introduction to Sustainable Development: 2015 International Hellenic University
3. TRANSFORMING OUR WORLD: the 2030 agenda for sustainable development
4. http://climatechange.edu.gr/ti-einai-i-klimatiki-allagi/
5. http://www.eea.europa.eu/el/themes/natural
6. http://www.eop.org.gr/news/91-2011-06-14-15-03-41.html

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OE01D: MANAGEMENT INFORMATION SYSTEMS (Open Elective-I)

Teaching Scheme	Examination Scheme
Lectures: 2 Hours/Week, 2 Credits	ESE : 60 Marks
Tutorial: 1 Hour/Week, 1 Credit	ISE : 40 Marks
	ICA : 25 Marks

COURSE OBJECTIVES:

1. Understand the role and impact of information systems in global business and organizational strategy.
2. Examine ethical, social issues of information systems and understand IT infrastructure trends.
3. Explore information systems security and understand e-commerce dynamics.

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Identify how information systems transform business processes and competitive strategies.
2. Analyze ethical implications and evaluate IT infrastructure trends for business efficiency.
3. Develop strategies for information system security and understand e-commerce principles.

SECTION-I

Unit 1: **Information Systems in Global Business Today** **No of Lectures-06**

The Role of Information Systems in Business Today, How information systems are transforming business, What is new in information system. Business Processes and Information systems, Tools and technologies for collaboration and social business

Unit 2:Information Systems, Organizations, and Strategy **No of Lectures-04**

Organizations and it's features, How Information Systems Impact on Organizations, Competitive strategies using information systems ,Challenges posed by strategic information systems

Unit 3 : Ethical and Social Issues in Information Systems **No of Lectures-05**

Understanding Ethical, Social, political issues raised by information systems, principles for conduct in ethical decisions, Contemporary information systems technology. Challenges to the protection individual privacy and intellectual property.

SECTION-II

Unit 4: IT Infrastructure and Emerging Technologies **No of Lecture-06**

IT Infrastructure, Infrastructure Components, Contemporary Hardware Platform Trends, Contemporary Software Platform Trends, Organizing Data in a Traditional File Environment, Major Capabilities of Database Management Systems, Using Databases to Improve Business Performance and Decision Making, Managing Data Resources

Unit 5: Securing Information Systems **No of Lectures-04**

System Vulnerability and Abuse, Business Value of Security and Control, Organizational Framework for Security and Control, Technologies and Tools for safeguarding Information Resources

Unit 6: E-commerce: Digital Markets, Digital Goods **No of Lectures-05**

Features of e-commerce, Digital Markets, Digital Goods**,** principles e-commerce business and revenue models, e-commerce business-to-business transaction, Role of M-commerce in business & its applications

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Internal Continuous Assessment (ICA) :

The teacher should prepare a group of 4-5 students and assign them any case study based on the above chapters. These are few topics for case studies are

1. Digital Transformation at Indian Railways
2. Data-Driven Decision Support Systems in Reliance Indu
3. Digital Health Mission and e-Hospital Systems
4. Unified Payments Interface (UPI) System
5. Reliance JioMart's E-commerce Strategy
6. SAP ERP Implementation at Tata Steel/ Infosys
7. Flipkart's Supply Chain Innovation
8. TCS's Use of TCS iON for HR Management
9. HDFC Bank's Use of CRM for Customer Engagement
10. Delhivery's Technology-Driven Logistics

Text Books:

1. Management Information Systems: Managing the Digital Firm, 15th Edition by Kenneth C.Laudon and Jane Laudon, Pearson Education
2. Management Information Systems: Sashikala Parimi, Kogent Learning Solutions Inc.

Reference Books:

1. Information Technology for Management: Transforming Organizations in the Digital Economy, Efraim Turban,6th Edition, Wiley Edition
2. Management Information Systems: Shubhalakshmi Joshi, SmitaVaze, Biztantra

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S. Y. B. Tech III

OE01E: FUNDAMENTALS OF DIGITAL MARKETING (Open Elective I)

Teaching Scheme	**Examination Scheme**
Lectures –2 Hours/week, 2 Credits	**ESE–**60 Marks
Tutorial –1 Hour/week, 1 Credit	**ISE-** 40 Marks
	ICA–25 Marks

Digital Marketing is the practice of promoting products, services, or brands using digital channels such as search engines, social media, email, and websites. In today's technology-driven world, it is essential for businesses to leverage digital marketing to reach a wider audience, engage customers, and drive sales. The need for digital marketing is underscored by the increasing shift of consumer behavior towards online platforms, making it a crucial component for business success and competitive advantage. This subject equips students with the necessary skills and knowledge to create, implement, and analyze effective digital marketing strategies.

Course Prerequisite:

Students should have a basic understanding of marketing principles and proficiency in using computers and the Internet. Familiarity with social media platforms and fundamental concepts of web browsing is also recommended.

Course Objectives:

1. To introduce students to the fundamental concepts of digital marketing.
2. To provide a basic understanding of digital marketing channels and strategies.
3. To develop essential skills in creating and managing simple digital marketing campaigns.

Course Outcomes:

After completing this course, students shall able to –

1. Analyze the basics of digital marketing concepts and its terminologies.
2. Identify and use different digital marketing channels.
3. Apply basic skills in creating and analyzing digital marketing content.
4. Able to use essential digital marketing tools.

Unit-1 -Introduction to Digital Marketing **No of Lectures-05**

Definition and scope of digital marketing, Evolution of digital marketing, Traditional marketing vs. digital marketing, Overview of digital marketing channels (search engines, social media, email, content, YouTube, etc.).

Unit-2 - Website Basics and SEO Fundamentals **No of Lectures-06**

Basics of website design and development, Importance of user experience (UX) and user interface (UI), Introduction to SEO (Search Engine Optimization), On-page SEO: keywords, meta tags, and content optimization, Off-page SEO: backlinks and social signals.

Unit-3 - Introduction to Content Marketing and social media **No of Lectures-07**

Role of content in digital marketing, Types of digital content (blogs, videos, infographics, etc), Basics of content creation and planning, Overview of major social media platforms (Facebook, Instagram, Twitter, LinkedIn), Basics of social media marketing.

Unit-4- Basics of Email Marketing and Online Advertising **No of Lectures-05**

Importance of email marketing, Building and managing email lists, Creating basic email campaigns Introduction to online advertising, Overview of Google Ads and social media ads.

Unit-5-Analytics and Trends in Digital Marketing **No of Lectures-07**

Introduction to digital marketing analytics, Basic metrics and KPIs (Key Performance Indicators),

Using Google Analytics for basic insights, Overview of current trends in digital marketing (e.g., influencer marketing, video marketing), Ethical considerations in digital marketing.

Internal Continuous Assessment:

It should consist of 6 to 8 assignments/case studies/surveys on the topics mentioned in the above syllabus. The outline of the possible assignments could be:

- Case studies of successful digital marketing campaigns OR Group discussions on the impact of digital marketing on businesses.
- Hands-on session on creating a simple website using website builders (e.g., WordPress)&Basic SEO optimization exercises
- Creating and managing social media profiles like writing a blog post.
- Designing a simple email newsletter.
- Group project on a current digital marketing trend.
- Students must be encouraged to join and complete free online courses/certifications on Infosys Springboard, Google Digital Garage, etc.

- **Textbooks:**
    1. Digital Marketing All-in-One For Dummies, Published by: John Wiley & Sons.
    2. Social MediaMarketingThe Next Generation ofBusiness Engagement, ByDave Evans& Jake Mckee, Weily Publishing House.
    3. DigitalMarketingStrategy by Simon Kingsnorth, 2016 Publisher-Kogan Page Limited.
    4. "Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation" by Damian Ryan, Publisher-Kogan Page Limited
- **Reference Books:**
    1. eMarketing: The essential guide to digital marketingBy Rob Stokes, Publisher- Open Education Resources.
    2. Content Marketing Handbook, Publication - Lifelong Learning Programme.

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OE01F: CYBER LAWS (Open Electives- I)

Teaching Scheme	**Examination Scheme**
Lectures – 2 Hrs. /week, 2 Credits	ESE– 60 Marks
Tutorial – 1 Hrs. /week, 1 Credit	ISE – 40 Marks
	ICA– 25 Marks

Introduction:

This course provides a comprehensive understanding of cybercrime, its impact on the global landscape, and the legal frameworks designed to combat it. Students will explore the Indian IT Act 2008, including its latest amendments, and learn to apply IT laws to various legal issues. Additionally, the course covers key information security standards and their implementation in software design and development.

Course Prerequisite: Basic knowledge of computer systems and the internet is required. Familiarity with network security principles, legal concepts and prior exposure to software development principles are beneficial but not mandatory

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Course Objectives:

1. To understand and identify different types cybercrime and cyber law
2. To recognized Indian IT Act 2008 and its latest amendments
3. To learn various types of security standards compliances

Course Outcomes:

After completing this course, student shall be able to–

1. Demonstrate the concept of cybercrime and its effect on outside world
2. Interpret and apply IT law in various legal issues
3. Distinguish different aspects of cyber law
4. Apply Information Security Standards compliance during software design and development

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UNIT 1 -Introduction to cybercrime **No of Lectures-06**

Introduction to Cybercrime: Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes

UNIT 2 -Cyber offenses & Cybercrime **No of Lectures-04**

Cyber offenses & Cybercrime: How criminal plan the attacks, Social Engg, Cyber stalking, Cyber café and Cybercrimes, Botnets

UNIT 3- Tools and Methods Used in Cybercrime **No of Lectures-06**

Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)

UNIT4 -The Concept of Cyberspace **No of Lectures-04**

The Concept of Cyberspace: E-Commerce, The Contract Aspects in Cyber Law, The Security Aspect of Cyber Law ,The Intellectual Property Aspect in Cyber Law

UNIT 5 –Indian IT Act **No of Lectures-06**

Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments

UNIT 6 - Information Security Standard compliances **No of Lectures-04**

SOX, GLBA, HIPAA, ISO, FISMA, NERC, PCI

Internal Continuous Assessment (ICA)

- ICA consists of a minimum 8 Tutorial assignments based on the curriculum.

- **Text Books:**

1. Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi
2. The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi
3. The Information Technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.
4. Cyber Law & Cyber Crimes By Advocate Prashant Mali; Snow White Publications, Mumbai

- **Reference Books**

1. Nina Godbole, Information Systems Security, Wiley India, New Delhi
2. Kennetch J. Knapp, Cyber Security &Global Information Assurance Information Science Publishing.
3. William Stallings, Cryptography and Network Security, Pearson Publication
4. Websites for more information is available on : The Information Technology ACT, 2008- TIFR : https://www.tifrh.res.in
5. Website for more information , A Compliance Primer for IT professional :
6. https://www.sans.org/reading-room/whitepapers/compliance/compliance-primer-professionals

Walchand Institute of Technology, Solapur

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

EEM01 ENTREPRENEURSHIP DEVELOPMENT

Scheme	**Examination Scheme**
Lectures– 1 Hour/week, 1 Credit	**ICA** - 50 Marks
Tutorial – 1 Hour/week, 1 Credit	

Entrepreneurship education in India has gained relevance in today's context. Education in the area of entrepreneurship helps students to develop skills and knowledge, which could benefit them for starting, organizing and managing their own enterprises. Entrepreneurship education encourages innovation, fosters job creation, and improves global competitiveness. This course will focus on key attributes of Entrepreneurship: Qualities of a successful entrepreneur, Entrepreneurship Development Programmes, Ideation Techniques, Business Plan Formulation, and Different Support Systems. To sum up, the course will make students to have an understanding of the complete entrepreneurial ecosystem.

Course Objectives:

1. To familiarize with entrepreneurship and its significance in national development
2. To develop skills required to establish and run a successful enterprise
3. To acquaint with the options available with new entrepreneurs
4. To formulate business plan/project report for a startup
5. To acquaint with support system associated with entrepreneurial development

Course Outcomes:

After completing this course, student shall be able to -

1. Identify the qualities required to become a successful entrepreneur
2. Select the proper type of Entrepreneurship Development Programmes
3. Identify the business opportunities that fit the individual or the group & prepare a business plan
4. Select a proper funding option for establishing new enterprise.

Unit-1: Entrepreneur **No. of lectures-3**

Concept, meaning and definitions of entrepreneur, need of entrepreneur, intrapreneur, social entrepreneur, qualities of entrepreneurs, types of entrepreneurs.

Unit-2: Entrepreneurship Development **No. of lectures- 4**

Concept of entrepreneurship, Entrepreneurship Development Programmes (EDPs)- meaning & need of EDPs, course content & curriculum of EDPs, phases of EDPs, problems of EDPs

Unit-3: Entrepreneurial Project Development **No. of lectures- 4**

Idea generation–sources and methods, preparation of a project report/ business plan including: market plan, financial plan, operational plan, HR plan, working capital management, break even analysis etc.

Unit-4: Small-Medium Enterprises and Support Systems **No. of lectures- 3**

Meaning and definition of Micro, Small & Medium Enterprises, forms of business ownership, Funding options available, role of government organization to support business.

- **Internal Continuous Assessment (ICA) :**

Students of a batch should be divided into groups (consisting of maximum five members) to carry out the following tasks:

1. Two case studies on successful entrepreneurs
2. Two case studies on failure of businesses
3. Idea generation & selection of an idea for business
4. Preparation of project report / business plan for starting a small unit and presentation on the same.

- **Textbooks**

1. Entrepreneurial Development, Dr. S. S. Khanka, S. Chand Publications
2. Small-Scale Industries and Entrepreneurship - Vasant Desai, Himalaya Publishing House
3. Entrepreneurship, Alpana Trehan, Dreamtech Press

- **Reference Books**

1. Dynamics of Entrepreneurial Development and Management - Vasant Desai, Himalaya Publishing House
2. Entrepreneurship & Small Business, Michael Schaper, Thierry Volery, Pauli Weber, Kate Lewis, Wiley Publicatiion
3. Entrepreneurship, Robert Hisrich, Michael Peters, Dean Shepherd, Sabyasachi Sinha, McGraw Hill Publication

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Walchand Institute of Technology, Solapur

S. Y. B. Tech. (All Branches of Engineering) Semester-III

VEC01: UNIVERSAL HUMAN VALUES

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ESE: 50 marks

The salient features of this course are:

1. It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality "as it is") through the process of self-exploration.
2. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living.
3. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information.
4. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

Course Prerequisite:

None. UHV-I Universal Human Values – Introduction (desirable)

Course Objectives:

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards valuebased living in a natural way. Holistic, Value-Based Education for Realising the Aspirations articulated in NEP2020

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

Course outcomes : At the end of the course, students will be able to,
By the end of the course, students are expected to;
1. Become more aware of themselves, and their surroundings (family, society, nature)
2. Would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. Have better critical ability toward Self, Body, Family, Society and Nature .
4. Become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
5. 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.

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: **No of Lectures-07**
1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its 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 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 understanding and living in harmony at various levels.

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself! **No of Lectures-07**
1. Understanding 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, 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 **No of Lectures-08**
1. Understanding Harmony in the family – the basic unit of human interaction
2. Understanding values in human-human relationship; 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, Difference between respect and differentiation; the other salient values in relationship

5. Understanding the harmony in the society (society being an extension of 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 **No of Lectures-08**

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. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Common wealth Purblishers.
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. Subhas Palekar, 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. https://drive.google.com/drive/folders/16eOka8AoBpLGlCDajRvk4MXgfXQWzFCB?usp=sharing

Walchand Institute of Technology, Solapur

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

MDM01 SMART BUILDINGS

Teaching Scheme:	**Examination Scheme:**
Lectures: 2 hours per week, 2 Credits	ISE: 40 marks
	ESE: 60 marks

This course provides a thorough introduction to Smart Building Technology, and its concepts related to building Management Systems for the development of intelligent and smart buildings.

Course Prerequisite: None

Course Objectives:

1. To enhance the knowledge of Smart Building Technologies
2. To make students to know about the concept of Building Automation
3. To evaluate the functioning of Smart Buildings.

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

1. Understand the system of Smart Technology
2. Understand the technology involved in Integrated Building Management System (IBMS) in Smart buildings
3. Illustrate the philosophy of building Management systems and IoT.
4. Understand the technology available in Heating, Ventilation, and Air Conditioning (HVAC) and Lighting control systems.
5. Understand the technology available in fire safety and security systems for intelligent buildings.

SECTION-I

Unit 1: Introduction to Smart Buildings: No of Lectures-02

- Definition and Overview, History and evolution, Benefits and challenges

.

Unit 2: Integrated Building Management System (IBMS) in Smart Buildings: No of Lectures-05

- Introduction to Integrated Building Management System (IBMS) Smart buildings.
- Components of Smart Building IBMS.

Unit 3: Building Management Systems (BMS) and IoT: No of Lectures-05

- Building Management Systems (BMS): Components of BMS, Functions and Architecture.

- Internet of Things (IoT) in Smart Buildings: IoT fundamentals: IoT devices and sensors, Communication protocols.

SECTION-II

Unit 4: Heating, Ventilation, and Air Conditioning (HVAC) and Lighting Controls Systems: No of Lectures- 06

- Human Comfort: Air Quality-Thermal comfort in buildings-Ventilation-Classification of HVAC - DDC applications - Control Panel: HVAC Control Panel, Networks, BAC Net, Modbus, LON-Electrical Installation Power Transmission - Smart Lighting Systems

Unit 5: Fire Protection Systems: No of Lectures-06

- Introduction: Causes and Stages of Fire, Fire Service Installation, Fire Alarm. Principles of Operation, Fire Sensors: Smoke detectors and their types, Fire control panels, Fire and Life safety, and Fire Management in buildings.

Unit 6: Security Systems: No of Lectures-06

- Introduction to Security Systems: Concepts, Perimeter Intrusion, Security Design, Access control system, RFID enabled access control, Computer system access control: CCTV, Components of CCTV system, Central alarm systems, and Structural health monitoring systems.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of a minimum of five assignments based on the entire curriculum and which will be assessed by concerned faculty.

- **Text Book:**

1. Shengwei Wang, “Intelligent Buildings and Building Automation”, Spon Press, London, 2009.
2. Derek Clements and Croome, “Intelligent Buildings: An Introduction”, Routledge, 2013 Civil Engineering.

- **Rence Books:**

1. Derek Clements and Croome, “Intelligent Buildings: An Introduction”, Routledge, 2013
2. James Sinopoli “ Advanced Technology for Smart Buildings”, Artech House, 2016
3. James.M.Sinopoli, Smart Buildings Systems for Architects, Owners and Builders Publishers:” Butter worth Heinemann, 2009
4. James Kachadorian “ Passive Solar House: the complete Guide to Heating and cooling Your Home “ Chelsa Green Publishing: Revised and expanded Second edition, 2006 Ron Bakker, “Smart Buildings: Technology and the Design of the Built Environment”, RIBA Publishing, 2020.

Walchand Institute of Technology, Solapur

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

CEPCC05 ENVIRONMENTAL ENGINEERING

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

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

The course focuses on developing and applying scientific and engineering principles to improve and sustain the natural environment. It involves the study of water and wastewater management, and design practices. Key topics include identification of water resources, water quality checking, design of water supply schemes, and introduction to various wastewater treatment technologies.

Course Prerequisite:
The student has completed a course in Fluid Mechanics & Fluid Machines of Civil Engineering and has an adept knowledge of basic Hydraulics. The student should also have insights into engineering chemistry.

Course Objectives:

5. To make students describe the importance of water quality and quantity and interpret the design of water supply systems
6. To make students apply the appropriate technologies for water treatment.
7. To make students explain the impacts of sewage and select design conveyance systems for sewage and stormwater.
8. To make students identify and apply appropriate process for the sewage treatment and sludge management.

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

7. Examine and explain various sources of water, water quality and quantity estimation.
8. Analyze appropriate water treatment technology.
9. Interpret the concepts of designing and managing water supply systems.
10. Understand and explain the fundamentals of wastewater generation, conveyance system, wastewater quality and explain and illustrate various methods of wastewater treatment.

SECTION-I

Unit 1: Water & Quantity Estimation: No of Lectures-04 Sources of water, water quality requirement for different applications, water quality standards, Environmental policy and legislation, water quality indices, water demand, population forecasting methods.

Unit 2: Water Treatment Processes (Aeration, Mixing, and Settling): No of Lectures-06
Treatment: Philosophy, Unit processes, and operations Aeration: Process, Types of aerators, Design of cascade aerator, Coagulation: Physics and chemistry, Practice, Design of rapid mixer Flocculation: Theory, Design of slow mixer, Settling: Theory, Types, and Design of rectangular and circular clarifiers for type 1 settling, Design of clarriflocculator

Unit 3: Water Treatment Processes (Filtration and Disinfection): No of Lectures-06
Granular Filtration: Classification, Components of deep bed filter, clean filter bed head loss, Filter operation, Design of filter, Disinfection: Types, Ideal and non-ideal disinfectant, Chlorination, Chemistry of chlorination, Chlorine demand, Chlorination practice, UV and Ozone disinfection

SECTION-II

Unit 4: Advanced Treatment Processes: No of Lectures-04
Membrane filtration: Types, Basic concepts, Applications Adsorption: Introduction, Basics of Carbon adsorption, Ion Exchange: Theory, Design of softener Point of use purifiers

Unit 5: Water Distribution Systems: No of Lectures-04
Components of water supply system, conveyance of water, distribution system, water supply appurtenances, service reservoirs and design.

Unit 6: Sewage & Sewage Treatment: No of Lectures-06
Need for conveyance and treatment of sewage, domestic wastewater and storm water estimation, conveyance of sewage - sewers, shapes design parameters, sewage pumping, sewer appurtenances, design of sewerage systems, Physico-chemical and biological treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, sewage sludge management

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INTERNAL CONTINUOUS ASSESSMENT (ICA)

(B) Experiments for the determination of the following (Min.12):

14. pH value
15. Acidity
16. Alkalinity
17. Chloride content
18. Hardness
19. Turbidity
20. Residual Chlorine
21. Solids–Total, Suspended, dissolved, volatile and fixed
22. Dissolved Oxygen
23. Most Probable Number

24. Optimum dose of alum by jar test
25. Biochemical Oxygen Demand
26. Chemical Oxygen Demand
27. Sulphates
28. Oil & Grease

(C) Visit to water treatment plant

Internal Continuous Assessment (ICA) submission shall consist of journal containing

3. Abovementioned Experiments
4. Visit report describing water treatment units of the plant visited.
5. Assignments on each unit based on the syllabus.

- **Text Books**

7. Raju, B.S.N., "Water Supply and Wastewater Engineering" Tata McGraw Hill Private Limited, New Delhi, 2nd Edition, 2000.
8. Garg, S. K. "Water Supply Engineering", Khanna Publishers, 33rd Edition, 2010.
9. Modi, P. N., "Water Supply Engineering (Environmental Engineering I)", Standard Book House, 6th Edition, 2018.
10. Nathanson, J. A., "Basic Environmental Technology", PHI Learning private limited, 5th Edition, 2009.
11. Modi, P. N., "Wastewater Engineering" Standard Book House, 6th Edition, 2018.
12. Peavy H, S, Rowe D, R, and Tchobanoglous G, "Environmental Engineering", McGraw-Hill Book Company, Indian Edition, 2017.

- **References**

1. "Manual on Water Supply and Treatment", CPHEEO, Ministry of Housing and Urban Affairs Development, Govt., of India, New Delhi, 1999.
2. Hammer M, J and Hammer M, J, "Water and Wastewater Technology", PHI learning private limited, 7th Edition, 2018.
3. Davis, M, L, and Cornwell, D.A., "Introduction to Environmental Engineering", Tata McGraw Hill Publishing Company, Special Indian Edition, 2010.
4. Nathanson, J. A., "Basic Environmental Technology", PHI Learning private limited, 5th Edition, 2009.

Walchand Institute of Technology, Solapur

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

CEPCC06 CONCRETE TECHNOLOGY AND MATERIAL TESTING

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

This course provides basic knowledge regarding physical and chemical properties of various ingredients of concrete. It deals with testing procedures and standard specifications for checking the suitability of ingredients for making good quality concrete. Also provides fundamental knowledge regarding the strength and durability properties of fresh and hardened concrete. It explains the procedure and gives hands-on experience in concrete mix design for various concrete grades using relevant Indian Standard (I.S.) codes. The course provides exposure to a variety of established material testing procedures and techniques, according to Indian Standards to check the suitability of materials in construction.

Course Prerequisite:

The student has completed a course in Basic Civil Engineering and has an adept knowledge of various building materials.

Course Objectives:

1. To make students aware of physical and chemical properties of ingredients of concrete.
2. To make students learn the behavior of fresh and hardened concrete
3. To make students design the concrete mixes for different grades using professional codes.
4. To make students apply quality control techniques in the field
5. To make students carry out Material Testing using relevant codes in the laboratory

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

1. Relate material characteristics and their influence on the properties 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 Indian standard codes.
4. Apply quality control techniques in the field
5. Carry out Material Testing in the laboratory

SECTION-I

Unit 1: Ingredients of Concrete No. of Lectures-08

Cement manufacturing process, chemical composition, and their importance, hydration of cement, types of cement. Testing of cement. Fine aggregate: Functions, requirements, Alternatives to River sand, Coarse aggregate: Importance of size, shape, and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Water– qualities of water. Chemical admixtures – plasticizers, superplasticizers

Unit 2: Fresh Concrete Workability No. of Lectures-06

Factors affecting workability. Measurement of workability–slump, Compaction factor, Vee-Bee Consistometer, 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. Good and bad practices of making and using fresh concrete

SECTION-II

Unit 3: Hardened Concrete No. of Lectures-06

Factors influencing strength, W/C ratio, gel/space ratio, accelerated curing. Testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete –plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. factors influencing durability, Durability requirements as per IS-456 latest version.

Unit 4: Concrete Mix Proportioning No. of Lectures-07

Concept, 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 No. of Lectures-03

Tension test on Mild and Tor Steel, Stress-strain relationship, Water absorption, and Compression test on burnt Bricks.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Testing of cement

1) Testing of cement viz. Consistency, Fineness, setting time, Soundness, and Compressive Strength, using relevant IS Codes

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 cone test

2) Compaction Factor test

3) Vee- Bee Consistometer test

4) Flow Table test

II. Hardened Concrete

1) Compressive strength test

D. Concrete Mix design: Proportioning as well as Experimental, as per IS10262: 2019 shall be demonstrated.

E. Testing of materials:

1) Tension test on Mild and Tor Steel

2) Water absorption and Compression test on burnt Bricks

- **Textbooks**

1. Concrete Technology (Theory and Practice) by Shetty, M. S., & Jain, A. K. S. Chand Publishing.
2. Concrete Technology by Neville, A. M., & Brooks, J. J. England: Longman Scientific & Technical.
3. Concrete Technology by S.S.Bhavikatti. Wiley Publishing
4. Concrete Technology by A.R. Santhakumar. Oxford University Press, New Delhi.
5. Concrete Technology (Theory and Practice) by Gambhir, M. L. McGraw Editions.

- **Reference Books/Codes**

1. Concrete Technology by Job Thomas, CENGAGE Learning.
2. Highway materials & Pavement by Khanna & Justo, Nem Chand & Broths.
3. Handbook on Advanced Concrete Technology by Nayak, N. V., & Jain, A. K. Alpha Science International.
4. Concrete-Micro structure, Property and Materials by Kumar Mehta. P and Paulo J.M. Monteiro. McGraw Hill Education.
5. I.S.456-2000 (reaffirmed 2021). Indian Standard Code of Practice for Plain & Reinforced Concrete.
6. I.S.10262-2019. Guidelines for Concrete Mix Design.

7. I.S.4031-1996 (reaffirmed 2021). Methods of Physical Tests on Cement
8. I.S.269-2015. Specifications for 33 Grade cement
9. I.S.8112-2013. Specifications for 43 Grade cement
10. I.S.12269-2013. Specifications for 53 Grade cement
11. I.S.383-2016 Specifications for Coarse & Fine Aggregates for Concrete.
12. I.S.1199-2018 Methods of Sampling & Analysis of Concrete.
13. I.S.2386-1963(reaffirmed 2021) Methods of Tests for Aggregates for Concrete
14. I.S.516-1959 (reaffirmed 2018) Methods of Tests for Strength of Concrete
15. Relevant I.S. codes for Testing and specifications of different building materials.

Walchand Institute of Technology, Solapur

T. Y. B. Tech. (Civil Engineering) Semester-IV

CEPCC07 STRUCTURAL MECHANICS- II

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

This course covers structural analysis concepts, Eccentric loading on short columns, chimneys under wind pressure, dam problems, Euler's and Rankine's formulas for columns, beam deflection methods, arch analysis, indeterminate structures, stiffness concepts, moment distribution, and the development of flexibility and stiffness matrices for beams and portal frames.

Course Prerequisite:

The student has completed a course in structural Mechanics I. Understanding of statics, mechanics of materials, engineering mathematics. Familiarity with stress, strain, equilibrium, internal forces, and basic structural design concepts is essential.

Course Objectives:

1. Understand and analyze the effects of eccentric loading on column, wind pressure on chimneys, and basic dam stability.
2. Evaluate effective length, slenderness ratio, and calculate crippling loads using Euler's and Rankine's formulas, considering their assumptions and limitations
3. Understand beam deflection methods and analyze parabolic and semi-circular arches, determining thrust and shear forces.
4. Analyze and evaluate indeterminate structures, degrees of freedom, stiffness, and apply moment distribution methods to beams and portal frames.
5. Apply stiffness and flexibility concepts to derive equations, coefficients, matrices, and analyze beams and portal frames.

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

1. Evaluate structural stability under eccentric loads and wind forces, and solve simple dam problems.
2. Calculate critical loads, identifying structural stability factors, and evaluating design limitations for practical applications in engineering.
3. Determine critical buckling loads and identifying structural stability factors, and evaluating design limitations for practical applications in engineering
4. Calculate beam deflections and analyze arch structures for, radial shear, and normal thrust.

5. Derive stiffness and flexibility parameters, develop matrices, and analyze beams and portal frames using advanced structural analysis methods.

SECTION-I

Unit 1: Combined Direct and Bending Stresses: No of Lectures-05

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

Unit 2: Behavior of Axially Loaded Long Columns: No of Lectures-03

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

Unit 3: Slope and Deflection of Determinate Beams: No of Lectures-04

Conjugate beam method. Deflection of beams by strain energy method

Unit 4: Three Hinged Arches: No of Lectures-03

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: No of Lectures-03

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: No of Lectures-04

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: No of Lectures-04

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: No of Lectures-04

Concept of stiffness, linearly elastic structures, derivation of Stiffness equation, Stiffness Coefficients, Development of stiffness matrix, Analysis of beams (D.K.I. $\leq$ 3), 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) – by S.B. Junnarkar, Charator Book Publishing House.
2. Structural Analysis- by Negi and Jangid, Tata McGraw-Hill Publishing Company Ltd., New Delhi
3. Analysis of Structures (Vol. II) – by Vazirani and Ratwani, Khanna Pub., Delhi
4. Structural Analysis- Matrix Approach- by Pandit & Gupta, Tata McGraw-Hill Publishing Company Ltd., New Delhi
5. Structural Analysis – II by Bhavikatti, Vikas Publications, New Delhi
6. Structural Analysis, by R. Agor, Khanna Publishing House
7. Mechanics of Materials, by B.C. Punmia & A.K. Jain, Laxmi Publications
8. Advanced Structural Analysis, by A.K. Jain, Nem Chand Bros.
9. Theory of Structures, by Punmia, Laxmi Publications

- **Reference Books**

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

CEPCC8 BUILDING PLANNING AND MODELLING

Teaching Scheme:	**Examination Scheme:**
Lectures: 1 hours per week, 1 Credit	ICA: 25 marks
Drawing: 2 hours per week, 1 Credits	POE: 25 Marks

This course provides a thorough introduction to the functional requirements and structures of buildings. It also covers the development of CADD skills for designing building components, creating detailed perspective view drawings, and planning and designing residential buildings with CADD to ensure compliance with building bylaws

Course Prerequisite:

The student has completed a course in the Basics of Civil Engineering and has an adept knowledge of they should possess a foundational understanding of civil engineering principles, including structural components, material properties, and construction techniques. Additionally, students should be proficient in CADD software for drafting and design purposes. This prior knowledge will ensure they are well-prepared to understand functional requirements and building structures, develop advanced CADD skills for creating detailed drawings of building components, produce accurate perspective view drawings, plan and design residential buildings and ensure compliance with relevant building bylaws.

Course Objectives:

1. To make students plan and design public buildings, develop their ability to design such buildings according to specified requirements, and ensure adherence to National Building Code norms and standards.
2. To make students prepare detailed permission drawings for public buildings to obtain building permission from the competent authority using suitable Computer Aided Drawing and Design (CADD) application software.
3. To make students design building services layouts plan such as furniture requirements, electrification points, water supply, and drainage systems, by standard norms using CADD application software
4. To make students produce perspective and line drawings create perspective drawings of the building and line plans of any two public buildings using CADD application software, demonstrating a comprehensive understanding of architectural representation.
5. To make students compile a comprehensive report prepare a detailed report on the selected public building, encompassing design rationale, adherence to standards, and an overall project assessment.

Course outcome: After successful completion of the course, students will be able to,

1. Plan and design a "Public Building" according to requirements adhering to National Building Code norms and standards.
2. Prepare "Permission Drawing" for public buildings to obtain building permission from competent authority by using suitable 'Computer Aided Drawing and Design' application software.
3. Plan and design appropriate building services layout for "Furniture requirement, Electrification points, Water supply, and Drainage System" for a building as per standards norms by using suitable 'Computer Aided Drawing and Design' application software.
4. Prepare "Perspective drawing of the building" and "Line plan of any two Public Buildings" by using suitable 'Computer Aided Drawing and Design' application software.
5. Prepare a report on the selected Public Building.

Unit 1: Planning and Design of Public Buildings: No of Lectures-10

- Educational Building: Pre-primary and primary school, Secondary and HigherSecondary 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 2: Building Permissions and its Procedure: No of Lectures-5

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

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. Preparation of drawings for any one public building by using AutoCAD

1) Building Permission Drawing
2) Furniture layout plan
3) Electrification layout plan
4) Water supply and Drainage layout plan
5) Perspective drawing of the building.

B. Line plan of any two public buildings by using AUTOCAD

C. Report on building project under (A) above.

D. Site visit for the type of public building selected for planning and designing forInternal Continuous Assessment (ICA) submission

END SEMESTER EXAMINATION (Practical - Oral)

1. Practical examination shall be based on assessment of knowledge of students about planning skills and CADD drafting skills related to public building. (Maximum two hours shall be allotted to students to complete given task on CADD during Practical and viva Exam.)
2. In addition, an oral examination shall be based on Practical and ICA.

- **Text Books**

1. Building Construction: Arora and Bindra, Dhanpat Rai Publications
2. Building Design and Drawing – Y. S. Sane, Allies Book Stall
3. Principles of Perspective drawing- Shah, Kale, Patki, Tata McGraw HillPublication Ltd, Delhi
4. Building Construction by Sushil Kumar, Standard Publishers Distributors, Delhi
5. Interior Design- Principles and Practice- M. Pratap Rao, Standard Publishers andDist.,Delhi
6. Building Planning and Design by Kumar Swami and Kameshwar Rao, CharotarPublishing House.
7. Civil Engg. Drawing- by M. Chakraborty, Published by M. Chakraborty – Kolkata
8. Civil Engineering Drawing – by R.S.Malik, G.S.Meo, Computech PublicationLtd New Asian.
9. Learning 'AutoCAD' software –Omeru

- **Reference Books:**

1. Building Construction by Mckay, W. B. & Mckay, J. M. ,Vol.III and IV,Donhead Publishing Limited
2. Modern Building Construction by Warland D. E., Vol. I and II, Pitman Publishing
3. Building Drawing – Shah, Kale, Patki, Tata McGraw-Hill Education
4. Built Environment by Shah, Kale, Patki, Tata McGraw-Hill Education
5. Construction science – by Edwin Walker, Selwyn Morgan, Hutchinson Educational
6. Time savers standards for buildings – Calendar Pub. McGraw Hill
7. Alternative Building Materials & Technology-by Jagdish ,Reddy, Rao Publishedby New Age International, New Delhi

Walchand Institute of Technology, Solapur

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

CEVSEC03 PROGRAMMING IN PYTHON

Teaching Scheme:	**Examination Scheme:**
Lectures: 1 hour per week, 1 Credit	ICA: 25 marks
Practicals: 2 hours per week 1 credit	POE: 50 marks

Python is a popular, general-purpose, multi-paradigm, open-source, scripting language. It is designed to emphasize code readability – and has a clean syntax with high-level data types. It is suited for interactive work and quick prototyping while being powerful enough to write large applications. This course introduces the Python language which has simple syntax, a powerful set of libraries, and a robust debugger and profiler.

Prerequisite course(s): None

Course Objectives:

1. Acquire knowledge of Python and script programming language.
2. Acquaint with different tools in Python.
3. Understand and implement file-handling concepts in Python.
4. Write Python Programs for solving Civil Engineering problems

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

1. Elaborate basics of Python programming.
2. Develop and implement control statements and functions with packages.
3. Apply NumPy and plotting tools in Python.
4. Write Python Programs for solving Civil Engineering problems

Unit 1: Introduction to Python: No of lectures-04

Script Model Programming, Understanding Python variables, basic Operators, Declaring and using Numeric data types: int, float, complex, using string data type and string operations, defining list and list slicing, List manipulation using in-build methods, Use of Tuple data type, Dictionary manipulation.

Unit 2: Python Program Flow Control, functions, and packages: No of lectures-04

Conditional blocks using if, else, and elif, Simple for loops in Python, for loops using ranges, string, list, and dictionaries, Use of while loops in Python, Loop manipulation using pass,

continue, break and else. Programming using Python conditional and loops block. Programming using string, list and dictionary in build functions. Organizing Python codes using functions, Understanding Packages Powerful Lambda function in Python Programming using functions, modules, and external packages.

Unit 3: NumPy and Matplotlib: No of lectures-04

What is NumPy? How to install NumPy, Arrays, Array indexing, Array Vs Listing Data types, Array math, Broadcasting. Matplotlib -Plotting, subplots and images

Unit 4: Python file operation: No of lectures-03

Reading config files in Python, Writing log files in Python, Understanding read functions, read(), readline(), and readlines(). Understanding write functions, write() and writelines(). Manipulating file pointer using seek. Programming using file operations.

Internal Continuous Assessment (ICA):

Minimum 10 program assignments covering all the above topics.

- **Text Books:**
  1. Programming in Python 3, Mark Summerfield, Second Edition
  2. Learning Python, Mark Lutz, O'reilly

- **Reference Books:**
  1. Python Cookbook, David Beazley and Brian K. Jones, Third Edition, Shroff Publishers & Distributors Pvt. Ltd., ISBN :978-93-5110-140-6
  2. Learning Python, Mark Lutz, 5th edition
  3. Programming Python (English), Mark Lutz, 4th Edition
  4. Testing Python, David Sale, Wiley India (P) Ltd., ISBN :978-81-265-5277-1

E-resources:

1. Python documentation - https://docs.python.org/3/

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

CEEEM02 PRINCIPLES OF MANAGEMENT AND QUANTITATIVE TECHNIQUES

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

Examination Scheme:
ISE: 40 marks
ESE: 60 marks

This course provides a thorough introduction to and application of the decision-making techniques required for decision-making in an organization. The course also introduces material and material management concepts and applies inventory control techniques for effective decision-making. Additionally, the course covers Lean Construction and ERP, along with the application of quality control charts for monitoring and checking.

Course Prerequisite: None

Course Objectives:

1. To make students aware of the function of management planning required for the successful functioning of an organization.
2. To teach students various decision-making techniques.
3. To instruct students on material management techniques and inventory control methods in the construction industry.
4. To educate students about Lean Construction and Construction ERP.
5. To teach students statistical methods and control charts.

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

1. Demonstrate the function of management for effective management of construction projects.
2. Apply various decision-making techniques in the construction industry.
3. Identify inventory costs associated with construction projects and apply ABC analysis and EOQ for inventory control, along with break-even analysis for decision-making in the construction industry.
4. Initiate the introduction of lean construction techniques and construction ERP in the construction industry.
5. Use statistical methods and control charts (X, R, p, c charts) for quality control of materials and workmanship in civil engineering projects.

SECTION-I

Unit 01: Functions of Management: **No of Lecture-04**

- Functions of Management: Planning, Organizing, Staffing, Leading, Directing, Monitoring and Controlling.
- Management by Objectives (MBO).
- Organization and its types: Formal and informal organization, Centralization, De-centralization, Line organization, Line and staff organization, and Functional organization.

Unit 02: Decision Making and its types **No of Lecture-10**

- **Decision under certainty**: Linear Programming, Formulation of simple L-P model, Graphical method, Simplex method, Duality.
- Application of Linear Programming in 'Transportation Problems: North-West corner method, least cost method, Vogel's Approximation method (Only Initial Basic Feasible Solution), and Application of Linear Programming in 'Assignment problems.

Unit 03: Decision under uncertainty and Risk: **No of Lecture- 04**

- **Decision under Uncertainty:** Wald's (Principle) Criteria, Savage (Principle) Criteria, Hurvitz (Principle) Criteria, and Laplace (Principle) Criteria
- **Decision under Risk:** Expected Monitory Value (EMV) and Expected Opportunity loss Value.

SECTION-II

Unit 04: Inventory control: **No of Lecture- 06**

- Introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks.
- Break-even analysis

Unit 05: Lean Construction and Construction ERP: **No of Lecture- 02**

- Introduction to Lean Construction and Construction ERP

Unit 06: Statistical Quality Control: **No of Lecture -04**

- Introduction: Statistical Quality Control, Control chart and types: X, R, P, C charts.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) shall consist of a minimum of six assignments based on the entire curriculum which have a weightage of 10 marks.

- **Text Books**

1. A Textbook of Organizational Behaviour, CB Gupta, S. ChandPublications
2. Construction Engineering & Management, S.C. Sharma & S.V. Deodhar, Khanna Book Publishing
3. Optimization Techniques, S.S. Rao, Wiley EasternIndia
4. Operation Research, Hamdy A. Taha, Operation Research, Prentice Hall of India, New Delhi, 8thEd.2011
5. Store Management, Menon K. S., Store Management, McMillan Co. New Delhi, 2nd Ed. 1998.
6. Statistical Quality Control, E. L. Grant, Statistical Quality Control, Wiley International Education, 6thEd.
7. Udo Linden, Mrunalini Kulkarni, Hit-Office Construction ERP technical manual, Engineering Design Software and Services Pvt. Ltd., Pune, April 2018Edition.

- **Reference Books**

1. Total Quality Management, Ponia & Sharma, Khanna Publishing House, Delhi
2. Engineering Management: Industrial Engineering & Management, S.C. Sharma, Khanna Publishing House, Delhi
3. Principles and Practice of Management, Prasad, L.M, Sultan Chand
4. Organizational Behaviour, L.M. Prasad, Sutan Chand and Sons.
5. Handbook of Construction Management, Joy PK, Macmillan
6. Construction Project Management, Jha, Pearson
7. Total Quality Management, Gopal, PHI Publications
8. Industrial Engineering & Operations Management, S.K. Sharma. S.K. Kataria & Sons
9. Principles of Operation Research: Prentice Hall of India, 2nd Ed.1925,Wagner H. M.
10. Operation Research: Shaum's outline series, Richard Bronson Govindsami N., Tata McGraw Hill , 2nd Ed.2004
11. Material Management, Gopal Krishnan, Sudeshan,
12. Handbook of Quality Control, Juran J. M., A. B. Godfrey, Mc Graw- Hill

Walchand Institute of Technology, Solapur

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

OE2A– Applied Mathematics (Open Elective-II)

Teaching Scheme:
Lecture: 2 hr/week, 2 credits
Tutorial:1 hr/week, 1 credit

Examination Scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

The course consists of linear differential equations which can be used for mathematical model of electrical circuits, deflection of beam, oscillations of spring etc. Laplace transforms is another powerful mathematical tool for converting signals from time domain to frequency domain. The course also introduces partial differential equations which occurs in heat flow and wave equation. This course also focuses on probability distributions that are useful for data analysis.

Course Prerequisite:
Fundamentals of trigonometry, Methods of finding roots of algebraic equations, Differentiation, Integration, Partial fractions, and Basics of probability.

Course Objectives:

1. To introduce to students method of solving higher order linear differential equations
2. To introduce to students methods of solving partial differential equations.
3. To introduce to students Laplace transforms and inverse Laplace transforms.
4. To introduce to students numerical methods.
5. To introduce to students various probability distributions.

Course Outcomes:
After completing this course, student shall be able to –

1. Solve higher order linear differential equations arising in various engineering fields.
2. Apply the concept of partial differential equations for solving engineering problems.
3. Apply integral transform technique such as Laplace transforms to solve ordinary differential equations with initial conditions.
4. Apply numerical methods to solve algebraic & transcendental equations and evaluate definite integrals used in modern scientific computing.
5. Apply the concepts of probability distribution to interpret the data.

Unit 1: Higher order linear differential equations with constant coefficients and applications No of lectures – 06

Basic definitions, Differential operator, Complimentary function, Particular integral: Shortcut-Method for standard functions like e^{ax}, sin(ax+b) , cos(ax+b) , x^m, $e^{ax}v$ and Engineering applications.

Unit 2: Partial Differential Equations No of lectures – 06

Classification of second order partial differential equations, Method of separation of variables, Solutions of one dimensional wave equation and one dimensional heat equation.

Unit 3: Laplace transform No of lectures – 08

Definition, Laplace transform of standard functions, properties-First shifting Theorem, multiplication of power t, division by t, Laplace transform of derivative and integral. Evaluations of improper definite integrals by Laplace transform method. Inverse Laplace transform of standard functions, Inverse Laplace transforms by first shifting theorem, Partial fraction method. Solution of linear differential equations with initial conditions

Unit 4: Numerical Methods No of lectures – 05

Introduction, Basic properties of equations. Regula-Falsi method, Newton-Raphson Method, Newton Cotes Integration Formula: Trapezoidal rule, Simpson's Rule (1/3rd and 3/8th), Interpolation - Lagrange interpolation.

Unit 5: Probability Distributions No of lectures – 05

Random variable, descrete and continous random variable, probability density function, Binomial, Poisson and Normal distributions.

Internal Continuous Assessment (ICA):

ICA shall consist of a minimum of five assignments / tutorials based on the above syllabus.

Text Book:

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 Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publications, New Delhi.
4. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.
5. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill.
6. Numerical Methods in Engineering and Science by B. S. Grewal, Khanna Publication, Delhi.
7. Advanced Engineering Mathematics, Peter O'Neil, Cengage Learning.
8. Engineering Mathematics, Srimanta Pal, Subodh Chandra Bhunia, Oxford University Press

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Second Year B. Tech. Semester-IV

OE2B – Higher Engineering Mathematics (Open Elective-II)

Teaching Scheme:
Lecture: 2 hr/week, 2 credits
Tutorial:1 hr/week, 1 credit

Examination Scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

The course consists of linear differential equations which can be used for mathematical modeling of electrical circuits, deflection of beam, oscillations of spring etc. This course also introduces Fourier transform and Z transforms which are the powerful mathematical tools for engineering problems such as circuit analyses in Electronics/electric and signal processing etc. This course also focuses on the concepts like vector integral calculus and complex integration applicable to engineering.

Course Prerequisite:
Fundamentals of trigonometry, methods of finding roots of algebraic equations, Differentiation, Integration, Partial fractions, Vectors and complex numbers.

Course Objectives:

1. To introduce to students methods of solving higher order linear differential equations.
2. To introduce to students Fourier and Z transforms for continuous and discrete systems.
3. To introduce to student the concept of vector integral calculus required in electromagnetic fields & wave theory.
4. To introduce to student the concept of complex integral calculus applicable to engineering.

Course Outcomes: After completing this course, student shall be able to –

1. Solve higher order linear differential equations arising in various engineering fields.
2. Apply Fourier transforms for the analysis of simple electrical circuits.
3. Apply the concept of Z transform and its applications to discrete systems and image processing.
4. Perform vector integration, analyze the vector fields and apply to electromagnetic fields & wave theory.
5. Analyze Complex functions, Contour integration applicable to electrostatics, digital filters, signal and image processing.

Unit I: Linear Differential Equations with constant coefficient and Applications

No of lectures – 06

Basic definitions, Differential operator, Complimentary function, Particular integral: Shortcut-Method for standard functions like e^{ax}, sin(ax+b) , cos(ax+b) , x^m, $e^{ax}v$ and Engineering applications.

Unit II: Fourier Transform No of lectures – 06

Fourier Transform (FT): Complex exponential form of Fourier series, Fourier integral theorem, Fourier Sine & Cosine integrals, Fourier transform, Fourier Sine and Cosine transforms and their inverses.

Unit III: Z - Transform No of lectures – 06

Z - Transform (ZT): Introduction, Definition, Standard properties, ZT of standard sequences and their inverses. Solution of difference equations.

Unit IV: Vector Integral Calculus and Applications No of lectures – 06

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications to problems in Electro-magnetic fields.

Unit V : Complex Integration No of lectures – 06

Functions of Complex variables, Cauchy's integral theorem, Cauchy's integral formula, Laurent's series, Cauchy's Residue theorem.

Internal Continuous Assessment (ICA):

ICA shall consist of a minimum of five assignments / tutorials based on the above syllabus.

- **Text Books:**

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. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.
4. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill.

- **Reference Books:**

5. Advanced Engineering Mathematics, Peter O'Neil, Cengage Learning.

Walchand Institute of Technology, Solapur

Second Year B. Tech. Semester-IV
OE2C – Advanced Engineering Mathematics

Teaching Scheme:
Lecture: 2 hr/week, 2 credits
Tutorial:1 hr/week, 1 credit

Examination Scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

The course consists of linear differential equations which can be used for mathematical modelling of electrical circuits, deflection of beam, oscillations of spring etc. Laplace transforms is another powerful mathematical tool for engineering problems such as circuit analyses in Electronics/electric and signal processing etc. The course also introduces fundamentals of statistics - lines of regression, coefficient of correlation and curve fitting which are useful for digital communication.

Course Prerequisite:
Fundamentals of trigonometry, method of finding roots of algebraic equations, differentiation, integration, partial fraction, basics of statistics.

Course Objectives:

5. To introduce to student method of solving higher order linear differential equations.
6. To introduce to student Laplace transform and inverse Laplace transforms.
7. To introduce to student measure of central tendency and measure of dispersion.
8. To introduce to student lines of regressions and curve fitting.

Course Outcomes:
After completing this course, student shall be able to –

6. Solve higher order linear differential equations arising in various engineering fields.
7. Apply Laplace and inverse Laplace transforms for analysis of simple electrical circuits.
8. Apply the concepts of statistics to interpret the variability of data.
9. Develop the relation between two variables for the given data using regression and fitting the curve for the given data.

Unit 1: Higher order linear differential equations with constant coefficients and applications No of lectures – 06

Basic definitions, Differential operator, complimentary function, particular integral, Shortcut-Method for standard functions like e^{ax}, sin(ax+b), cos(ax+b), x^m, $e^{ax}v$, Particular integral by General method and Engineering applications.

Unit 2: Laplace transform No of lectures – 06

Definition, Laplace transform of standard functions, properties-First shifting Theorem, change of scale, multiplication of power t, division by t, Laplace transform of derivative and integral. Evaluations of improper definite integrals by Laplace transform method.

Unit 3: Inverse Laplace transform and Applications No of lectures – 06

Laplace transform of Periodic functions, Unit step functions and Unit impulse functions.
Inverse Laplace transform of standard functions, Inverse Laplace transforms by first shifting theorem, Partial fraction method. Solution of linear differential equations with initial conditions.

Unit 4: Introduction to Statistics No of lectures – 06

Measures of central tendency, Measures of dispersion, Coefficient of variation, Central Moments, Skewness and Kurtosis.

Unit 5: Descriptive Statistics No of lectures – 06

Coefficient of correlation by Karl Pearson's method and lines of regression of bi-variate data. Curve fitting by Least square approximation principle (straight line, second degree parabola and exponential curves).

Internal Continuous Assessment (ICA):

ICA shall consist of a minimum of five assignments / tutorials based on the above syllabus.

Text Book:

9. A textbook of Applied Mathematics Vol. II and Vol. III, J.N. and P.N. Wartikar, Vidyarthi Grah Prakashan, Pune.
10. Higher Engineering Mathematics, Dr.B.S. Grewal, Khanna Publications, Delhi.
11. A Textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publications, New Delhi.
12. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.
13. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill.
14. Fundamentals of Statistics by S C Gupta, Himalaya Publishing House.

Reference Books:

15. Advanced Engineering Mathematics, Peter O'Neil, Cengage Learning.
16. Engineering Mathematics, Srimanta Pal, Subodh Chandra Bhunia, Oxford University Press

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Second Year B. Tech. Semester-IV
OE2D – Statistics and Fuzzy logic

Teaching Scheme:
Lecture: 2 hr/week, 2 credits
Tutorial:1 hr/week, 1 credit

Examination Scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

This course introduces basic and advanced topics of statistics which are useful in data analysis. This course introduces numerical methods (Unlike analytical methods) to solve simultaneous systems of linear equations. This course also introduces the fuzzy set theory in brief which deals with characterizing the concept of uncertainty and its relationship to the increasingly important concept of information and complexity. It also includes optimization techniques like simplex method and assignment problems.

Course Prerequisite:
Elementary set theory, Basics of statistics and Elementary transformations in matrices.

Course Objectives:

1. To introduce to students the basic and advanced concepts of statistics.
2. To introduce to students various numerical methods to solve the system of linear simultaneous equations.
3. To introduce to students comprehensive coverage of fuzzy sets.
4. To enable students to solve Linear Programming Problems and Assignment Problems.

Course Outcomes:
After completing this course, student shall be able to –

1. Apply the basic concepts of statistics to interpret the variability of data.
2. Develop the relation between two variables for the given data using regression and fitting the curves for the given data.
3. Solve the system of linear simultaneous equations arising in Machine learning and Data science.
4. Solve optimization problems of real life using Simplex method and Assignment Problems.
5. Understand the concept of fuzzy sets and it's applicability to engineering.

Unit 1: Introduction to Statistics No of lectures – 06

Measures of central tendency, Measures of dispersion, Coefficient of variation, Central Moments, Skewness and Kurtosis.

Unit 2: Descriptive Statistics No of lectures – 06

Coefficient of correlation by Karl Pearson's method and lines of regression of bivariate data. Curve fitting by Least square principle (straight line, second degree parabola and exponential curves).

Unit 3: Numerical solutions to system of linear simultaneous equations No of lectures – 06

Direct methods – Gauss elimination method, Gauss – Jordan method, LU decomposition method. Iterative methods – Gauss – Jacobi method and Gauss – Seidel method.

Unit 4: LPP and Assignment Problems No of lectures – 06

Introduction to LPP, Simplex method for LPP, Assignment problem: Introduction mathematical formulation of Assignment Problems, Hungerian method to solve Assignment Problems.

Unit 5: Introduction to fuzzy sets No of lectures – 06

Crisp sets, Basic types of fuzzy sets, Basic concepts of fuzzy sets, Fuzzy sets vs Crisp sets, α−cut, Strong α−cut, Additional properties of α−cuts, representation of fuzzy sets and extension principle of fuzzy sets.

Internal Continuous Assessment (ICA):

ICA shall consist of a minimum of five assignments / tutorials based on the above syllabus.

Text Books:

1. Textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publications, New Delhi.
2. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.
3. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill.
4. Numerical Methods in Engineering and Science by B. S. Grewal, Khanna Publication, Delhi.
5. George J Klir and BoYuan, Fuzzy sets and Fuzzy logic– PHI India.

Reference Books:

1. Advanced Engineering Mathematics, Peter O'Neil, Cengage Learning.
2. Pundir & Pundir, Fuzzy sets and their applications – Pragati Publications.

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Second Year B. Tech. Semester-IV
OE2E: Applied Statistics and Transform

Teaching Scheme:
Lecture: 2 hr/week, 2 credits
Tutorial:1 hr/week, 1 credit

Examination Scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

This course focuses on the applied statistics tailored for undergraduate students in Engineering without diving deep into mathematical part. It covers probability theory, statistical methods, and their applications in engineering. It also introduces Fourier transform required for transforming non-periodic continuous signals from time domain to frequency domain.

Course Prerequisite:
Elementary mathematics, Basics of statistics and probability, Integration

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Course Objectives:

1. To make students aware about the basic concept of probability.
2. To introduce to students various types of probability distributions with focus on engineering applications.
3. To introduce to students methods of statistical and graphical summaries of data.
4. To introduce to students fundamental methods of correlation and regression.
5. To make student aware about Fourier transform and it's significance.

Course Outcomes:
After successful completion of this course, student will be able to -

1. Understand the basic concept of probability.
2. Solve numerical examples based on probability distributions.
3. Solve numerical examples based on descriptive statistics.
4. Solve numerical examples based on correlation and regression.
5. Apply the concept of Fourier transform to solve complex engineering problems.

Unit 1: Outcomes, Events and Probability **No of Lectures-6**

Sample spaces and events, counting techniques, interpretations and axioms of probability, unions of events and addition rules, conditional probability, intersections of events and multiplication and total probability rules, independence, Bayes' theorem.

Unit 2: Probability Distributions **No of Lectures-6**

Random variable, discrete and continuous random variables, probability density functions.
Advanced Probability Distributions: Hyper-geometric distribution, Exponential distribution, Gamma distribution.

Unit 3: Descriptive Statistics **No of Lectures-6**

Numerical summaries of data - measures of central tendency, spread and variability, frequency distributions and histograms, box-and-whisker plot, time sequence plots, scatter diagrams, probability plots.

Unit 4: Correlation and Regression **No of Lectures-6**

Coefficient of correlation, regression for Bi-variate data, simple linear regression, multiple linear regression, assessing the regression model.

Unit 5: Fourier Transform **No of Lectures-6**

Fourier transforms, Fourier sine transform, Fourier cosine transforms, and their inverses.
Examples of Fourier transforms.

Internal Continuous Assessment (ICA):

ICA shall consist of a minimum of five numerical assignments/tutorials / case studies based on the above syllabus and related to engineering applications

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Text Books:

1. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, Wiley
2. A Modern Introduction to Probability and Statistics: Understanding Why and How, F.M. Dekking C. Kraaikamp, H.P. Lopuhaa¨ L.E. Meester, Springer
3. Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce, Peter Gedeck, O'Reilly
4. Higher Engineering Mathematics, Ramana B.V. Tata McGraw Hill.

Walchand Institute of Technology, Solapur

Second Year B. Tech. Semester-IV

AEC02 GENERAL PROFICIENCY

Teaching Scheme	**Examination Scheme**
Lectures– 1 Hours/week, 1 Credit	**ICA** - 50 Marks
Tutorial – 1 Hours/week, 1 Credit	

This course includes a cluster of personal qualities, habits, attitudes that have the potential to make someone a good student and compatible with the requirements of academia. Put simply, they are the ways in which you talk, you move around, listen and present yourself. Students who possess such skills are more adept and academic savvy. They are able to gain a further understanding of tasks and successfully engage with them, enabling them to gain more control over their learning. Along with playing an important role in the development of students' overall personality and performance, this course also amount to good skills in communication; presenting information in a clear and concise manner; team-building ability; leadership; time management; group discussions; and interviews and interpersonal skills. All of which are important for students' academic development and growth.

Course Prerequisite:

The students need to have basic knowledge of communication language- oral and writing skill.

Course Objectives:

1. To nurture student's effective presentation skills
2. To make students communicate effectively in writing for a variety of purposes.
3. To develop the skills in interpersonal communication and in expressing the views in a clear and succinct manner.
4. To inculcate soft skills in students for personal and professional success

Course Outcomes:

At the end of this course, the student will be able to

1. Prepare good quality presentations and deliver them effectively.
2. Perform effectively in group discussions and personal interviews.
3. Draft resumes, letters, emails, and reports professionally with appropriate content and context.
4. Exhibit various soft skills like email writing, task management, elevator pitch, SWOT analysis, etc.

Unit 1– Presentation Skills	No of lectures-04
Unit 2– Letter/Resume Writing Skills	No of lectures-02
Unit 3– Interview and Group Discussion Skills	No of lectures-04
Unit 4– Email writing Skills	No of lectures-02
Unit 5– Report writing Skills	No of lectures-02

- **Internal Continuous Assessment (ICA) :**
  ICA consists of minimum 8 tutorials based on curriculum.
  Recommended tutorials:
  11. Write a resume for various purposes.
  12. Prepare a power point presentation (slides) on a given topic
  13. Self-analysis (SWOT)
  14. Letter writing (Leave application, Job application, and Enquiry letter)
  15. Write a review article (Book Review/ Research paper review)
  16. Write a summary/abstract of the given article
  17. Group Discussion
  18. Personal interview (Mock)
  19. Email writing
  20. Poster Presentation

- **Text Books**

1. Gajendra Singh Chauhan & Sangeeta Sharma, Soft Skills: An Integrated Approach to Maximize Personality, Willy India Pvt. Ltd.
2. William Zinsser, On Writing Well, Harper Resource Book.
3. Dr. M. Hemamalini, Technical English. Willy India Pvt. Ltd
4. Aruna Koneru, Professional Speaking Skills. Oxford University Press

- **References Books**

1. K. Alex, Soft Skills, S. Chand Publications
2. Ajay R Tengse, Soft Skills – A Textbook for Undergraduates, Orient Black Swan
3. Sanjay Kumar, Pushpa Lata, Communication Skills, Oxford University Press
4. B N Ghosh, Managing Soft Skills for Personality Development, McGraw Hill Publication

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

VEC02 PROFESSIONAL ETHICS

Teaching Scheme	**Examination Scheme**
Lectures– 2 Hours/week, 2 Credits	**ISE** - 50 Marks

This course is designed to explore the principles and standards of moral and ethical conduct in professional settings. This course aims to equip students with the necessary tools to navigate complex ethical dilemmas and make informed decisions that uphold the integrity and ethical standards of their profession. It emphasizes the importance of ethical behavior in building trust, maintaining credibility, and fostering a positive professional environment.

Course Objectives:

1. To make student aware of Professional Ethics in engineering
2. To make student aware of various theories in Professional Ethics
3. To make student learn about safety, risk and responsibilities of an engineer
4. To make student learn about the global issues in Professional Ethics

Course Outcomes:

After completing this course, student will be able to

1. Follow Professional Ethics in his life.
2. Describe various theories in Professional Ethics.
3. Identify safety, risk and responsibilities of an engineer.
4. Behave consciously to global issues in Professional Ethics.

Unit 1 - Introduction to Professional Ethics No of lectures – 03

Introduction, Engineering and Professionalism, Two models of Professionalism, Three types of morality, Preventive Ethics, Aspirational Ethics

Unit 2 – Engineering Ethics No of lectures – 04

Senses of engineering ethics, Variety of Moral Issues, Types of Inquiry, Recent developments towards ethics in engineering, Moral Dilemmas-steps to solve moral dilemmas.

Unit 3 –Theories in Engineering Ethics No of lectures – 04

Kohlberg's Theory, Gilligan's Theory, Consensus and Controversy, Models of Professional Roles, Theories about Right Action, Self interest, Customs and Religion, Uses of Ethical theories.

Unit 4 – Engineering as Social Experimentation No of lectures – 03

Engineering projects vs Standard projects, Engineers as responsible experimenters, code of ethics, Industrial standards.

Unit 5 – Safety and Risk No of lectures – 04

Concept of safety, Engineers and safety, Risk- Types of accidents, Risk Benefit analysis, Reducing risk, Risk Management.

Unit 6 – Responsibilities of an Engineer No of lectures – 03

Collegiality, Loyalty, Respect of Authority, Collective Bargaining, Confidentiality, Conflict of Interest.

Unit 7 – Rights of an Engineer No of lectures – 03

Professional Rights, Employee Rights, Whistle Blowing, Intellectual Property Rights, Discrimination, Preferential Treatment.

Unit 8 – Global Issues No of lectures – 04

Multinational Corporation, Ways of promoting morally just measures, Environmental Ethics, Computer Ethics, Weapons Development, Engineers as Managers, Expert Witnesses and Advisors, Moral Leadership, Corporate Social Responsibility.

- **Textbooks**

1. R.S. Naagarazan, A Text Book of Professional Ethics & Human Values, New Age International, 2006.
2. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
3. Dr. N. Venkateswaran, Professional Ethics in Engineering, Sree Kamalamani Publications.

- **Reference Books**

1. Charles E. Harris Jr., Michael S. Pritchard and Michael J. Rabins, Engineering Ethics: Concepts and Cases, 4th Edition.

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S.Y. B. Tech Semester-IV

CEMDCE02 GEOINFORMATICS

Teaching Scheme	**Examination Scheme**
Lectures– 1 Hour/week, 1 Credit	**ISE** - 50 Marks
Practical -2 Hours/week, 1 Credit	**ICA** - 25 Marks

This course covers the fundamentals of remote sensing, GIS, GPS, and geoinformatics applications essential for spatial data analysis. Topics include remote sensing principles, GIS components and data structures, GPS technology and geo-positioning techniques, and geoinformatics applications in natural resource management, environmental studies, and urban planning, emphasizing practical applications in engineering and environmental practice.

Course Prerequisite: None

Course Objectives:

1. Explain remote sensing history, EMR interaction, platforms, sensors, and resolution types for analyzing satellite imagery data.
2. Understand GIS components, spatial and attribute data characteristics, raster vs. vector structures, and analyze satellite data.
3. Understand GPS history, segments, geo-positioning techniques, advantages, limitations, and practical applications in various fields.
4. Utilize geoinformatics for managing natural resources, environment, disasters, utilities, urban studies, military, navigation, and agriculture problems.

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

1. Understand remote sensing history, concepts, EMR interaction, platforms, sensors, and types of resolution in satellite imagery analysis.
2. Analyze and apply knowledge of GIS components, spatial and attribute data, raster vs. vector structures, and process satellite data in GIS.
3. Understand GPS history, advantages, limitations, segments, geo-positioning techniques, and practical applications across various fields.
4. Proficient to apply geoinformatics to manage natural resources, environment, disasters, utilities, urban areas, military, navigation, and agriculture, solving related problems.

SECTION-I

Unit 1: Introduction to Remote Sensing: No of Lectures-04

Remote sensing history, concept and principles, Interaction of EMR with atmosphere and Earth's surface, Remote sensing platforms and sensors, Concept of Resolution-spatial, spectral, temporal and radiometric, Satellite and their characteristics- geostationary and sun-synchronous

Unit 2: Fundamentals of Geographic Information System: No of Lectures-04

Components of GIS, Data used in GIS characteristics of Spatial Data – sources of spatial and attribute data, data structure - raster and vector, Processing of various satellite data.

SECTION-II

Unit 3: Global Positioning System and its Applications: No of Lectures-04

History of GPS, Advantages and limitations of GPS, Segments of GPS - Control segment, Space segment, User segment, Geo positioning - Point positioning, Relative Positioning, Static Positioning, Kinematics Positioning, Uses of GPS.

Unit 4: Application of Geoinformatics: No of Lectures-03

Application of Geoinformatics in Natural Resources Management, Environmental Studies, Disaster Management, Utilities Management, Urban Studies, Military Applications – Navigation - Location Based Services and Agriculture.

- **Text Books**

1. Introduction to GIS, Kang-tsung Chang, Tata McGraw Hill
2. Introduction to Remote Sensing, Campbell, J.B.2002, Taylor Publications
3. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001

- **Reference Books**

1. Fundamentals of Remote Sensing, Joseph George, 2003 Universities Press
2. Remote Sensing and Image Interpretation, Lillesand, T.M., and Kieffer, R.M., 1987, John Wiley
3. Remote Sensing Principles and interpretation, Sabbins, F.F., 1985, W.H. Freeman and company
4. Geographic Information Systems for Land Resources Assessment. Burrough, P.A.: Oxford: Oxford University Press
5. Fundamentals of Spatial Information Systems, Laurini, R and Thompson, D.: Academic Press London
6. Principles of Geographical Information System, Peter A. Burrough and Rachael A. Mc. Donnell, Oxford University Press Inc., New York, 2004
7. An Introduction to Geographical Information System, Ian Heywood, Sarah Cornelivs and Steve Carver, Pearson Education Pvt .Ltd., New Delhi, 2007

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S.Y. B. Tech Semester-IV

MASL01 ENVIRONMENTAL SCIENCE

Teaching Scheme	**Examination Scheme**
Lectures– 1 hour per week	**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: **No of Lectures-2**

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

Unit 2: Natural resources and associated problems: **No of Lectures-8**

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: **No of Lectures-8**

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: **No of Lectures-8**

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: **No of Lectures-8**

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: **No of Lectures-8**

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: **No of Lectures-8**

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.

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