Sanjay Ghodawat University Kolhapur

School of Engineering and Technology
Department of Civil Engineering

B. Tech. Civil Engineering

Curriculum Structure (R25)

Semester: III-IV

Course code	Course name	Teaching scheme (Hrs/week)			Credits assigned			Total credits
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	
UCVPC301	Structural Mechanics	3	-	-	3	-	-	3
UCVPC302	Building Design and Drawing	3	-	-	3	-	-	3
UCVPC303	Engineering Surveying	3	-	-	3	-	-	3
UXXMM0XX	Multidisciplinary Minor I	2	-	-	2	-	-	2
UCMEM001	Engineering Economics	2	-	-	2	-	-	2
USTVE004	Environmental Science & Sustainability	2	-	-	2	-	-	2
UCVPC305	Structural Mechanics Lab	-	2	-	-	1	-	1
UCVPC306	Building Design and Drawing Lab	-	4	-	-	2	-	2
UCVVS301	Software Proficiency I	-	4	-	-	2	-	2
UCVFP301	Field Project		4	-	-	2	-	2
Total		15	14		15	7		22

Semester III: Evaluation Scheme

Course code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work	Practical Oral/POE	
		T1	T2	FET	Total				
UCVPC301	Structural Mechanics	10	10	5	25	50	-	-	75
UCVPC302	Building Design and Drawing	10	10	5	25	50	-	-	75
UCVPC303	Engineering Surveying	10	10	5	25	50	-	-	75
UXXMM0XX	Multidisciplinary Minor I	-	10	5	15	35	-	-	50
UCMEM001	Engineering Economics	-	10	5	15	35	-	-	50
USTVE004	Environmental Science & Sustainability	-	10	5	15	35	-	-	50
UCVPC305	Structural Mechanics Lab	-	-	-	-	-	25	-	25
UCVPC306	Building Design and Drawing Lab	-	-	-	-	-	25	25	50
UCVVS301	Software Proficiency I						50	-	50
UCVFP301	Field Project	-	-	-	-	-	25	25	50
								Total	**550**

Programme Structure for B Tech.: Second Year Civil Engineering

Semester IV: Teaching Scheme

Course code	Course Name	Teaching scheme (Hrs/week)			Credits assigned			Total credits
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	
UCVPC401	Fluid Mechanics	3	-	-	3	-	-	3
UCVPC402	Concrete Technology	3	-	-	3	-	-	3
UCVPC403	Theory of Structure	3	-	-	3	-	-	3
UXXMM0XX	Multidisciplinary Minor II	2	-	-	2	-	-	2
UCMEM002	Project Management	2	-	-	2	-	-	2
UCVVS401	Software Proficiency II	-	4	-	-	2	-	2
UCVPC405	Fluid Mechanics Lab	-	2	-	-	1	-	1
UCVPC406	Concrete Technology Lab	-	4	-	-	2	-	2
UCMEM004	Strategic Management and Leadership	2	-	-	2	-	-	2
USTVE006	AI in Civil Engineering	2	-	-	2		-	2
Total		**17**	**10**		**17**	**5**		**22**

Semester IV: Evaluation Scheme

Course code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work	Practical Oral /POE	
		T1	T2	FET	Total				
UCVPC401	Fluid Mechanics	10	10	5	25	50	-	-	75
UCVPC402	Concrete Technology	10	10	5	25	50	-	-	75
UCVPC403	Theory of Structure	10	10	5	25	50	-	-	75
UXXMM0XX	Multidisciplinary Minor II	-	10	5	15	35	-	-	50
UCMEM002	Project Management	-	10	5	15	35	-	-	50
UCVVS401	Software Proficiency II	-	-	-	-	-	25	25	50
UCVPC405	Fluid Mechanics Lab	-	-	-	-	-	25	-	25
UCVPC406	Concrete Technology Lab	-	-	-	-	-	25	25	50
UCMEM004	Strategic Management and Leadership	-	-	-	-	-	50	-	50
USTVE006	AI in Civil Engineering	-	-	-	-	-	50	-	50
								Total	**550**

Exit Option:

- Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs.
- Students exiting the Second Year Programme after securing minimum 80credits will be awarded UG Diploma in the relevant Discipline /Subject provided they secure additional 4-8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc) offered during summer vacation after the second year.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC301	Structural Mechanics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCVPC301	Structural Mechanics	10	10	5	25	40%	50	40%	75

Course Description

The focus will be very much on basic mechanical properties of various materials like mild steel, copper, aluminum, tor steel etc. Fundamental laws of elasticity, elastic constants, concept of stress and strain, stress concentration will be taught. The behaviour of beams, shaft and cylinders under different kind of loadings will be also focused.

Pre-requisites: Engineering Mechanics, Engineering Mathematics I, II.

Course Objectives

- To introduce the fundamental principles of solid mechanics, focusing on stress, strain, and elasticity in various engineering materials.
- To develop analytical skills for determining shear forces, bending moments, and stress distributions in structural elements under varying load conditions.
- To teach the principles of strain energy and the stability analysis of columns and gravity structures.

Course Outcome(s) At the end of this course students will able to:

- **CO1** **Apply**^{4} the linear laws of elasticity as related to stress and strain.
- **CO2** **Illustrate**^{2} the concepts of solid mechanics
- **CO3** **Design**^{4} structural members subjected to tension, compression, torsion, bending and combined stresses
- **CO4** **Analyze**^{3} structural members subjected to strain energy

Course Contents

Module	Unit	Description	Hours
1.0		**Simple stress and strain**	**9**
	1.1	Concept of simple stress and strain, Hooke's law, elastic behaviour of the body under external actions, composite sections under axial loading.	
	1.2	Elastic constants, normal stresses and strains in three dimensions.	
2.0		**Shear force and bending moment diagrams:**	**9**
	2.1	Shear force and bending moment diagrams for statically determinant beams for point loads, moments.	
	2.2	SFD and BMD for uniformly distributed and uniformly varying loads, concept of point of contra flexure	
3.0		**Bending and Shear stress distribution in Beams:**	**9**
	3.1	Bending stresses in beams Assumptions in pure bending, bending formula, and moment of resistance, Stress distribution diagrams for rectangular, round, L and T shape beams etc.	
	3.2	Shear stress equation, Stress distribution diagrams for rectangular, round, L, T and triangular shape beams etc.	
4.0		**Strain Energy in beams and Analysis of Column**	**9**
	4.1	Strain energy due to different types of actions, impact loading. Strain energy method for deflection of determinate beams.	
	4.2	Analysis of long columns, Euler's theory and Rankine's theory	
5.0		**Combined direct and bending stresses**	**9**
	5.1	Kernel of the section, middle third rule, Direct and bending stresses in column	
	5.2	Stability analysis of gravity dams, retaining walls and chimneys.	

Text Books

1. "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

References

1. "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
2. "Mechanics of Materials" Vol I and II - Punmia, Jain, Laxmi Publications.
3. Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.
4. Strength of Materials" - Bhavikatti S.S., New Age Publications.

5. Strength of Materials" - R.K.Bansal, Laxmi Publications.
6. Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC302	Building Design and Drawing	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCVPC302	Building Design and Drawing	10	10	5	25	40%	50	40%	75

Course Description

This course focuses on the advanced principles of building planning, climatology, and adherence to legal building regulations

Pre-requisites: Overview of Civil Engineering, Basic Construction Practices.

Course Objectives

- To plan buildings by applying climatic orientations for energy efficiency and comfort.
- To follow statutory byelaws ensuring compliance with local building regulations.
- To integrate building services such as electrical, plumbing, HVAC, and fire safety into design.
- To prepare detailed layouts for diverse residential and public utility buildings.
- To develop holistic design skills merging aesthetics, functionality, sustainability, and safety.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Analyze**[3] building climatology principles and apply advanced planning techniques to optimize building orientation, thereby enhancing energy efficiency, thermal comfort, and sustainability across diverse climatic zones**.**
- **CO2** **Implement**[4] National Building Code (NBC) byelaws and navigate the legal procedures for building permissions.
- **CO3** **Design**[4] and draft efficient plumbing, drainage, and electrification layouts for residential structures.
- **CO4** **Evaluate**[3] and incorporate acoustic computations, air conditioning systems, and spatial planning strategies for public buildings.

Course Contents

Module	Unit	Description	Hours
1.0		**Principles of Building Planning and Drawing Fundamentals**	**09**
	1.1	**Fundamentals of Civil Drawing:** Introduction to architectural drawing for civil engineers. Concept of Line plan, Developed Plan, Elevation, and Section. Principles of architectural design relation between form and function, utility, and aesthetics. Selection of scales for various drawings and standard dimensioning practices.	
	1.2	**Principles of Building Planning:** Application of basic planning principles: Aspect, Prospect, Privacy (Internal & External), Furniture requirement, Roominess, Grouping, Circulation (Horizontal & Vertical), Sanitation, Elegance, Economy, and Flexibility. Orientation of buildings: Factors affecting orientation under Indian climatic conditions. Significance of Sun path diagram and Wind Diagram.	
2.0		**Building Byelaws & Residential Planning**	**09**
	2.1	**Building Byelaws:** Building Planning Byelaws & regulations as per SP-7 National Building Code of India (Group 1 to 5). Advanced concepts of Built-up area (BUA), Floor Space Index (FSI), Carpet area. Procedure of Building Permission, significance of commencement, plinth completion, and occupancy certificates.	
	2.2	**Residential Planning:** Planning and designing of Residential Buildings (Bungalows, Row Bungalows, Apartments, and Twin Bungalows). Preparation of detailed submission and working drawings.	
3.0		**Building Services - I (Plumbing, Electrification & Fire Safety)**	**09**
	3.1	**Plumbing & Drainage:** Various materials for the system (PVC, GI, AC, CI, HDPE, Stoneware). Various types of traps, fittings, and chambers. Design and need of Septic Tank. Concept of Plumbing & Drainage plan. Roof drainage: Concept of rain water gutters, rainwater outlet, and Down Tank Systems.	
	3.2	**Electrification & Fire Safety:** Concealed & Open Wiring, Requirements & Location of various electrical points, Concept of Earthing. Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, Characteristics of fire-resisting materials and their resistance to fire.	
4.0		**Building Services - II (HVAC & Acoustics)**	**09**

	4.1	**HVAC & Thermal Insulation:** Ventilation: Definition, necessity, functional requirement, and systems. Air conditioning: Purpose, Classification, Principles, Systems & Various Components. Thermal Insulation: General concept, Principles, Materials, Methods, Computation of Heat loss & heat gain in Buildings.	
	4.2	**Acoustics & Sound Insulation:** Absorption of sound, various materials, Sabine's formula, optimum reverberation time, conditions for good acoustics. Acceptable noise levels, Noise prevention at its source, Transmission of noise. Noise control-general considerations.	
5.0		**Planning of Public Buildings & Visualization**	**09**
	5.1	**Public Utilities:** Introduction to Planning of Public Buildings. Functional requirements and spatial/land use planning for different purposes like Education (Schools/Colleges), Health (Hospitals), Recreation, Industry, and Transportation.	
	5.2	**Modern Visualization:** Introduction to 3D rendering and Building Information Modeling (BIM) software for generating advanced architectural designs, building exteriors, and project presentations.	

Text Books

1 Building Drawing by M.G. Shah, C.M. Kale, and S.Y. Patki (Tata McGraw-Hill).

2 Building Planning and Design by Kumar Swamy and Kameshwara Rao (Charotar Publishing House).

References

1 National Building Code of India (SP 7), Bureau of Indian Standards.

2 Planning and Designing Buildings by Y.S. Sane (Allies Book Stall).

3 Building Construction by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain (Laxmi Publications).

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
UCVPC303	Engineering Surveying	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
UCVPC303	Engineering Surveying	T1	T2	FET	Total	Min pass	Marks	Min pass	
		10	10	5	25	40%	50	40%	75

Course Description

This course will introduce the fundamentals of surveying measurements to provide a broad overview of the surveying instrumentation, procedures, measurement corrections and reductions, survey datum's, and computations that are required to produce a topographical map or a site plan for engineering and design projects

Pre-requisites: -Elements of civil engineering. Mathematics

Course Objectives

- To introduce the fundamental principles of surveying and their applications in construction projects.
- To enable students to perform accurate linear and angular measurements, and calculate areas and volumes.
- To develop skills in producing topographical and contour maps for effective infrastructure planning.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Apply**[4] knowledge of levelling to calculate elevation of points
- **CO2** **Correlate**[4] the knowledge of theodolite in surveying
- **CO3** **Apply**[4] knowledge for setting out different types of curves
- **CO4** **Apply**[4] knowledge of advance surveying

Course Contents

Module	Unit	Description	Hours
1.0		**Levelling**	**09**
	1.1	Introduction, Basic definitions, , Temporary and permanent adjustment of Levels, Sensitiveness of bubble tube; Methods of levelling, reciprocal levelling Effect of curvature and refraction, Auto level, Tilting Level	
	1.2	Contouring – Contour interval – Methods of contouring – uses- direct and indirect methods of contouring	
	1.3	Computation of Areas and Volumes	
2.0		**Theodolite Surveying**	**09**
	2.1	Theodolite – Vernier theodolite – Component, Temporary and permanent adjustments – Measurement of horizontal and vertical angles – Methods of repetition and reiteration –Application of theodolite	
	2.2	Theodolite traversing – Objectives – traversing – methods – traverse computations – traverse table – plotting Omitted measurements	
3.0		**Tachometric surveying**	**09**
	3.1	Tachometric surveying – Principles – Methods – Stadia system –Fixed and Movable hair methods – Methods with staff held vertical and norm– Analytic lens – Sub tense bar – Tangential method.	
	3.2	Trigonometrically surveying: Base of the object accessible – base of an inclined – object accessible – reduced level of the elevated points within accessible bases – instrument axes at different levels	
4.0		**Curve setting**	**09**
	4.1	Introduction, Degree of Curve, Types of curves and their necessity, elements of simple curve, setting out of simple Curves by linear and angular methods	
	4.2	Vertical curves – types, lengths of vertical curves setting out	
5.0		**Advance Surveying**	**09**
	5.1	EDM principle, Introduction to Total station with field application, Introduction to Remote sensing, GIS, GPS	
	5.2	Introduction to Drone Surveying, application, Aerial photogrammetry – types of photographs, scale of vertical photographs, flight planning.	

Text Books

1 Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004..

2 Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi.

References

1 Arora K R"SurveyingVol1, 2&3), Standard Book House, Delhi,2004.

2 Surveying and leveling by R.Agor Khanna Publishers 2015

3 Surveying (Vol–1, 2&3),by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications(P) ltd., NewDelhi.

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on the entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
USTVE004	Environmental Science and Sustainability	**Theory**	**Practical**	**Tutorial**	**Theory**	**Practical**	**Tutorial**
		02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
USTVE004	Environmental Science and Sustainability	**T1**	**T2**	**FET**	**Total**	**Min pass**	**Marks**	**Min pass**	
		-	10	5	15	40%	35	40%	50

Course Description:

This course provides a comprehensive overview of environmental science, focusing on the interplay between natural resources, ecosystems, and human impact. Students will explore global environmental challenges such as pollution, climate change, and biodiversity loss, while learning about sustainable practices, green technologies, and environmental governance required for sustainable development

Pre-requisites: Basic knowledge of high school science.

Course objectives:

- To provide a general understanding of our environment, the challenges in exploiting natural resources, the importance of biodiversity, and the need for its conservation.
- To explain pollution impacts.

Course Outcomes: The student will be able to:

- **CO1** **Illustrate**[2] the scope and significance of environmental science and evaluate the role of individuals in achieving sustainable development.
- **CO2** **Classify**[2] and explain natural resources, ecosystem structure and functions, including energy flow, food chains, and ecological balance.
- **CO3** **Evaluate**[2] biodiversity, its levels, values, and threats, and recommend appropriate conservation strategies with reference to India.
- **CO4** **Interpret**[3] the causes, impacts, and control measures of environmental pollution and climate change, including waste management practices.
- **CO5** **Analyze**[3] environmental policies, laws, global initiatives, and sustainability practices, and apply them to real-life environmental management and green development.

Course Contents

Module	Unit	Description	Hours
1	1	**Foundations and Importance of Environmental Science**	6
	1.1	Multidisciplinary nature of environmental science; scope and importance; need for environmental awareness, Renewable and non-renewable resources, United Nations Conference on the Human Environment 1972; World Commission on Environment and Development and concept of sustainable development, Role of individuals in environmental protection.	
2	**2**	**Natural Resources, Ecosystems and Biodiversity**	6
	2.1	**Natural Resources:** land degradation, soil erosion, desertification, Water resources (floods, droughts, conservation); forest resources and deforestation, Alternative energy resources: solar, wind, biomass, hydropower, geothermal and tidal.	
		Ecosystem and Biodiversity: Structure and function of ecosystems; types (terrestrial and aquatic), Food chain, food web, ecological pyramids and energy flow. Biodiversity: concept, values and levels, India as a mega-diverse nation; threats and conservation methods (in-situ and ex-situ).	
3	3	**Environmental Pollution and Climate Change**	6
	3.1	Types, causes, effects and control of air, water and soil pollution, Solid waste management: municipal waste, biomedical waste, e-waste, plastic pollution and microplastics.	
4	4	**Environmental Governance and Legal Framework**	6
	4.1	Environment Protection Act, Air (Prevention & Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Environmental Impact Assessment (EIA), Environmental Management System (ISO 14001), Environmental audit.	
	4.2	**Environmental Treaties and Legislation:** Major International organizations and initiatives: United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN) and Intergovernmental Union panel on climate change (IPCC)	
5	**5**	**Sustainability and Green Development Practices**	
	5.1	**Sustainable Development:** Concept and pillars of sustainable development; Sustainable Development Goals (SDGs). Carbon footprint and sustainable resource use.	

	5.2	**Green Practices and Movements:** Green technology, green buildings, Eco-labeling, Green business, Environmental movements: Chipko Movement, Silent Valley Movement, Bishnoi community and Bhopal Gas Disaster.	
	5.3	Documentation of campus biodiversity.	
	5.4	Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.	

Textbooks

1. Anubha Kaushik and C.P. Kaushik (2004) "Perspective of Environmental Studies"
2. Dr P. D. Raut (2021) "Environmental Studies", Seventh Edition

Reference books:

1 . Eldon D. Enger (2016) "Environmental Science: A study of interrelationships"
2 . Jennifer A. Elliot (2012) "An Introduction to Sustainable Development", 4th Edition

Evaluation scheme

- Internal Assessment (T2 and FET):
- T2 should be based on two modules, for 10 marks each.
- Fifth module will be assessed for 5 marks separately.

End Semester Examination:

- Question paper will comprise of 5 questions, each carrying 7 marks.
- The duration of end semester examination shall be 2 hours.
- The students need to solve all 5 questions.
- Question No.1 will be compulsory and based on entire syllabus.
- Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC305	Structural Mechanics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVPC305	Structural Mechanics Lab	25	40%	-	-	25

Course Description

This laboratory course provides hands-on experience in testing and analyzing the mechanical properties of fundamental construction materials such as steel, aluminum, timber, and brick. Through destructive testing methods using universal testing machines and hardness testers, students will practically verify theoretical concepts of stress, strain, elasticity, and material failure.

Pre-requisites - Engineering Mechanics, and concurrent enrollment in Structural Mechanics (UCVPC301).

Course Objectives

- To experimentally determine the mechanical properties of various engineering materials under tension, compression, bending, and impact loading.
- To train students in operating standard material testing equipment like the Universal Testing Machine (UTM), Brinell, Rockwell, and Charpy/Izod apparatus.
- To correlate theoretical mechanics calculations with the actual physical behavior of materials and structural elements**.**

Course Outcomes: After the successful completion of the course students will able to

- **CO1** **Differentiate**[2] elemental properties of construction materials.
- **CO2** **Conduct**[3] tension and compression tests on different structural materials.
- **CO3** **Determine**[4] the flexural strength of beam elements.
- **CO4** **Assess**[5] the hardness of metals.

List of Experiments

Perform Any Eight experiment from given list:

1 To study the stress -strain characteristics of Tor steel by conducting tension test on U.T.M.

2 To study the stress - strain characteristics of Aluminum by conducting tension test.

3 To find the Brinnell's hardness numbers of (a) Steel (b) Brass (c) Aluminum.

4 To find the Rockwell hardness numbers of (a) Steel (b) Brass (c) Aluminum.

5 To find the Vicker's hardness numbers of (a) Steel (b) Brass (c) Aluminum.

6 To find the energy absorption of (a) Steel (b) Brass (c) Aluminum by Charpy impact test.

7 To find the energy absorption of (a) Steel (b) Brass (c) Aluminum by IZOD impact test.

8 To determine Compressive Strength of Timber

9 To determine bending Strength of Timber

10 To find the Compressive strength of brick

11 To study water absorption test on brick

12 To study effloresces test on brick

13 To conduct Compression test on Mild Steel rods

14 To determine Shear strength of mild and TMT steel.

Textbooks

1 "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

2 "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.

References

1 "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.

2 "Strength of Materials" - Bhavikatti S.S., New Age Publications

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC306	Building Design and Drawing Lab	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVPC306	Building Design and Drawing Lab	25	40%	25	40%	50

Course Description

The Building Design and Drawing lab course teaches students the practical application of building planning principles, statutory byelaws, and CAD drafting. It covers the preparation of municipal submission drawings, detailed working drawings for MEP services (plumbing, electrification), and spatial planning for residential and public buildings.

Pre-requisites: -Overview of Civil Engineering, Basic Construction Practices

Course Objectives

- To apply theoretical knowledge of climatology, building byelaws, and design principles in the practical drafting and planning of civil engineering structures.
- To develop hands-on skills using modern drafting techniques and tools for effective planning and execution of civil engineering projects.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Prepare[4]** municipal submission drawings for residential buildings in compliance with local byelaws
- **CO2** **Draft[4]** comprehensive working drawings, including foundation, plumbing, and electrification layouts
- **CO3** **Conduct[3]** a physical site measurement survey and draft existing building plans. |
- **CO4** **Calculate[3]** valuation of building /land by using different methods.

List of Work

1. **Measurement Drawing:** Based on actual measurement of an existing residential building (G+1). Drafting of plan, elevation, and section passing through the staircase. Includes site plan and area statement (Group of max 5 students).
2. **Municipal Submission Drawing:** Planning and design of a residential or commercial building (G+1) using AutoCAD. Drawing must include plan, elevation, section, site plan, schedule of openings, and area statement (BUA, FSI) as per building byelaws.
3. **Working Drawings (Structural & Layout):** Drafting of Foundation / Center Line Drawing and detailed Furniture layout plan for the designed residential building.
4. **Working Drawings (Services):** Drafting of the Electrification plan, and Water supply & Drainage (plumbing) plan for the designed building.
5. **Public Building Planning:** Preparation of a functional Line Plan for a public building (e.g., Lounge/Restaurant, Educational Institution, or Hospital) demonstrating spatial optimization.

Project Work.

1. Prepare a complete, integrated architectural portfolio for a G+1 residential/commercial structure, combining all 2D working drawings, service layouts, and a final 3D rendered model (Max group3 students).
2. Site visit to an ongoing building construction project along with a detailed observation report regarding site layout and execution of building services

References

1 Building Drawing by M.G. Shah, C.M. Kale, and S.Y. Patki (Tata McGraw-Hill).

2 Mastering AutoCAD for Civil Engineering (Standard Autodesk reference materials).

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per ‘credit and grading system’ manual and should be add and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done**.**

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVVS301	Software Proficiency I	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVVS301	Software Proficiency I	25	40%	25	40%	50

Course Description

AutoCAD is a computer-aided design (CAD) software used for creating 2D drawings and 3D models with precision and accuracy. This course provides hands-on training in drafting, modelling, and designing across engineering, architecture, and construction fields. Students will learn essential tools, commands, and techniques to develop professional drawings and design projects efficiently.

Pre-requisites: Building Design and Drawing (Theory), Basic Civil Engineering

Course Objectives

- To enable students to create reusable blocks for building components and draft comprehensive residential layouts — covering plans, elevations, and sections — that are suitable for plotting and presentation.
- To train students in producing professional-grade 2D civil engineering drawings using CAD software, including setting up drawing units, applying industry-standard layering, and dimensioning practices.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Apply**[3] CAD workspace settings, coordinate systems, and standard title blocks for civil drawings.
- **CO2** **Utilize**[3] Draw, Modify, and Layer management commands to create organized 2D structural geometries.
- **CO3** **Draft**[4] detailed floor plans, standard elevations, and cross-sections for residential buildings..
- **CO4** **Draft**[4] comprehensive municipal submission drawings and prepare plotting layouts..

List of Work

List of Work

1. Introduction to Auto Cad
2. Setup of CAD workspace, coordinate systems, and standard title blocks.
3. Application of dimensioning, text annotations, and civil-standard layer management.
4. Drafting structural geometries and creating reusable CAD blocks for civil components.
5. Development of a detailed 2D floor plan for a G+1 residential building.
6. Drafting corresponding front elevations and detailed structural cross-sections.
7. Drafting of structural centerline and foundation layout plans for excavation.
8. Drafting of basic building services layouts, including plumbing and electrification.
9. Introduction to 3D AutoCAD modeling: Creating basic 3D views, isometric perspectives of small model

Project Work

Planning and drafting a complete, professional AutoCAD portfolio (Plans, Elevations, Sections,Foundation layout, and Service plans) for a specific public building..

References

1 Mastering AutoCAD for Civil Engineering (Autodesk Official Training Guide).

2 Engineering Drawing and Graphics + AutoCAD by K. Venugopal (New Age International).

3 Building Planning and Drawing by Dr. N. Kumara Swamy and A. Kameswara Rao.

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per ‘credit and grading system’ manual and should be add and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
UCVFP301	Field Project	**Theory**	**Practical**	**Tutorial**	**Theory**	**Practical**	**Tutorial**
		-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
UCVFP301	Field Project	**Term Work**	**Min pass**	**Marks**	**Min pass**	
		25	40%	25	40	50

Course Description

This field project course provides immersive, hands-on experience in executing large-scale surveying tasks. Students will apply theoretical surveying principles to real-world scenarios, working in teams to conduct comprehensive topographical surveys, block contouring, and road alignment projects using advanced instruments like theodolites and Total Stations.

Pre-requisites: Concurrent or prior completion of Engineering Surveying (UCVPC303).

Course Objectives

- To provide intensive field training in handling surveying instruments for large-scale mapping and layout.
- To develop teamwork, problem-solving, and project execution skills by completing comprehensive surveying projects such as block contouring and road alignment.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Execute**[3] extensive field surveys accurately using leveling instruments, theodolites, and Total Stations.
- **CO2** **Produce**[3] detailed topographical maps and contour plans directly from collected field data.
- **CO3** **Calculate**[4] and set out road alignments and simple curves physically in the field.
- **CO4** **Collaborate**[4] effectively in teams to manage, execute, and present a comprehensive civil engineering field project.

List of Experiments

1. Reciprocal Leveling.
2. Sensitivity of Bubble tube
3. Permanent adjustment of dumpy level.
4. Measurement of horizontal angles by different methods by theodolite.
5. Measurement of vertical angles and vertical height of object

6. Measurement of bearing, deflection angle by theodolite
7. Determination of tachometric constants
8. Determination of grade of a given line.
9. Setting out of simple curves by different methods
10. Application of Total station

Project Work

1. Block Contouring / Radial Contouring
2. Road project

Viva Voce based on above practical and field project work

Textbook

1 Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004..
2 Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi.

References

1 Arora K R"SurveyingVol1, 2&3), Standard Book House, Delhi,2004.
2 Surveying and leveling by R.Agor Khanna Publishers 2015
3 Surveying (Vol–1, 2&3),by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications(P) ltd., NewDelhi.

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be add and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done**.**

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC401	Fluid Mechanics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCVPC401	Fluid Mechanics	10	10	5	25	40%	50	40%	75

Course Description

This streamlined course focuses strictly on the fundamental fluid mechanics required for civil engineering practice. It covers the essential calculations for hydrostatic forces on structures, pipe network design for water supply, open channel flow for irrigation, and the practical use of pumps on construction sites.

Pre-requisites: Engineering Mechanics, Engineering Mathematics.

Course Objectives

- To develop competence in addressing engineering challenges encountered in professional practice, ensuring students can translate theoretical knowledge into practical solutions.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Compute**[3] hydrostatic pressure distributions on dams and water retaining structures.
- **CO2** **Apply**[3] Bernoulli's principle to measure flow rates in pipes.
- **CO3** **Calculate**[4] friction and head losses to design efficient water supply pipe networks..
- **CO4** **Analyze**[3] uniform flow in open channels and select appropriate pumps for site dewatering

Course Contents

Unit	Description	Hours
	Fluid Properties & Hydrostatics	**09**
1.1	**Fluid Properties & Pressure:** Mass density, specific gravity, viscosity, capillarity. Pascal's Law and Hydrostatic Law. Measurement of pressure using simple and differential manometers**.**	
1.2	**Forces on Structures:** Calculation of Total Pressure and Centre of Pressure on horizontal, vertical, and inclined plane surfaces. Practical calculation of hydrostatic forces on curved surfaces (Focus exclusively on dam faces and sluice gates). Introduction to buoyancy, floatation, and concept of metacentric height.	
	Fluid Kinematics & Bernoulli's Principle	**09**
2.1	**Flow Basics:** Types of flow (Steady/unsteady, uniform/laminar/turbulent). 1-D and 2-D Continuity Equation for incompressible fluids.	
2.2	**Bernoulli's Theorem:** Energy of a liquid in motion. Euler's equation and derivation of Bernoulli's equation. Practical applications and numericals using Venturimeter and Pitot tube.	
	Flow Through Pipes	**09**
3.1	**Major & Minor Losses:** Reynold's Number and flow regimes. Darcy-Weisbach equation for friction loss. Minor head losses (sudden expansion, contraction, bends, and valves).	
3.2	**Pipe Networks:** Flow through pipes in series and parallel. Concept of equivalent pipe for municipal water distribution. Drawing Hydraulic Gradient Line (HGL) and Total Energy Line (TEL)..	
	Open Channel Flow	**09**
4.1	**Uniform Flow:** Geometric elements of open channels. Chezy's and Manning's formulas. Design of hydraulically efficient sections (Rectangular and Trapezoidal only).	
4.2	**Specific Energy & Hydraulic Jump:** Specific energy curve, critical depth. Phenomenon of Hydraulic Jump, relation of conjugate depths, and its practical use as an energy dissipator in spillways.	
	Flow Measurement & Pumps	**09**
5.1	**Notches and Weirs:** Discharge over rectangular and triangular (V-notch) weirs. Francis Formula. Concept of broad-crested weirs**.**	

5.2	**Pumps in Civil Engineering:** Introduction to centrifugal and submersible pumps. Basic working principles, priming, and calculation of pump head and power required for lifting water.	

Textbook

1. Fluid Mechanics and Hydraulic Machines by R.K. Bansal (Laxmi Publications) – Best for straightforward numericals.
2. Hydraulics and Fluid Mechanics by P.N. Modi and S.M. Seth (Standard Book House).

References

1. S. Ramamrutham, Hydraulics, Fluid Mechanics and Fluid Machines (Dhanpat Rai Publishing Company)..
2. R.K. Rajput, A Textbook of Fluid Mechanics and Hydraulic Machines (S. Chand Publishing).
3. K. Subramanya, Flow in Open Channels (McGraw Hill Education).

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC402	Concrete Technology	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCVPC402	Concrete Technology	10	10	5	25	40%	50	40%	75

Course Description

Concrete types and practical application. Selection of concrete mix proportions, fresh concrete properties. Cement types and their properties, pozzolanic additives, properties of the binder phase. Properties of aggregates and their influence, types and use of admixtures. Curing technology and shrinkage/crack sensitivity.

Pre-requisites: - Basic civil practices

Course Objectives

- To help students select appropriate concrete mix proportions and understand the properties of fresh concrete.
- To provide knowledge of cement types, pozzolanic additives, binder phase properties, aggregates, admixtures, and curing technologies, with emphasis on preventing shrinkage and cracking for durable construction.

Course Outcomes:

After the successful completion of the course students will able to:

- **CO1** **Determine[2]** the properties of concrete ingredients i.e. cement, fine aggregate and coarse aggregate.
- **CO2** **Explain[2]** the various process involved to produce good quality of concrete, list out the types of concrete admixture and decide the suitable admixture for specific purpose
- **CO3** **Determine[2]** the mechanical properties of concrete i.e. compressive, tensile, flexural etc.
- **CO4** **Decide[3]** suitable concrete for different structures considering the prevailing weathering Conditions

Course Contents

Module	Unit	Description	Hours
1.0		**Concrete materials**	**09**
1	1.1	Concrete materials: Cement - Ordinary Portland, Portland Pozzolana, chemical composition, grade of cement, hydration, tests for cement: fineness, soundness, compressive strength, setting time. Aggregates - classification, requirements, size, shape, texture, Tests for coarse Aggregates: specific gravity, grading of aggregate, Flakiness index, Elongation Index, Impact value, abrasion value, crushing value. Tests for fine aggregates: specific gravity, sieve analysis, fineness modulus, bulking of sand,	
2.0		**Fresh Concrete**	**09**
2	2.1	Workability, factors affecting, measurement of workability, different tests for workability, segregation, bleeding, process of manufacture of concrete - batching, mixing, transportation, compaction, curing of concrete, curing method.	
3.0		**Admixtures in concrete**	**09**
3	3.1	Air entraining agents, plasticizer and super plasticizer, accelerators, retarders, workability agents. Mineral admixtures: fly ash, silica flumes, Ground Glass Blast Furnace Slag, Metakoline.	
4.0		**Hardened Concrete:**	**09**
4		Strength of concrete, w/c ratio, gel/space ratio, gain of strength with age, maturity concept of concrete, effect of maximum size of aggregate on strength, Test on hardened concrete - flexural strength, comparison of cube test and cylinder test, Schmidt's rebound hammer, Ultrasonic pulse velocity method.	
5.0		**Special Concrete**	**09**
5	5.1	Special Concrete: Light weight concrete, no-fines concrete, high density concrete, Fiber reinforced concrete, self-compacting concrete, high strength concrete, high-performance concrete, cold weather concreting, hot weather concreting, pavement quality concrete.	
	5.2	Durability of concrete: Strength and durability relationship, effect of w/c on durability, different exposure condition as per IS 456 minimum and maximum cement contents, effect of permeability, sulphate attack, methods of controlling sulphate attack.	

References

1 Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995

2 Shetty M. S, "Concrete Technology", S. Chand and Company Ltd, New Delhi, 2003

3 Santhakumar. A.R; "Concrete Technology", Oxford University Press, New Delhi, 2007

4 Gupta B. L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.

5 Gambir. M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi.

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each

2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC403	Theory of Structures	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCVPC403	Theory of Structures		10	5	15	40%	35	40%	50

Course Description

This includes analysis of determinate and indeterminate structures Continuous beams, portal frames and plane frame. This course is divided into six units having different methods for analysis for indeterminate structures and interprets the output of different methods.

Pre-requisites: Engineering Mechanics, Structural Mechanics, Engineering Mathematics I, II.

Course Objectives

- To develop the ability to analyze indeterminate structures using methods including energy, flexibility, stiffness, direct stiffness, and finite element approaches.

Course Outcome(s) At the end of this course students will able to*:*

- **CO1** **Illustrate[2]** concept of Principle stress and strain and its graphical method
- **CO2** **Analyze[4]**determinate beam by slope deflection method
- **CO3** **Analyze[4]** indeterminate beams/frames by Clapeyron's theorem of three moment method.
- **CO4** **Analyze[4]** indeterminate beam by slope deflection and moment distribution method.

Course Contents

Module	Unit	Description	Hours
1.0		**Principal stress and strain**	**9**
	1.1	Principle stress in two dimensions, Introduction to graphical method.	
	1.2	Principal stress in beams and thin cylinders	
2.0		**Slope – deflection of determinate beams**	**9**
	2.1	Double in integration method, Macaulay's method,	
	2.2	oment-area method and conjugate beam method.	
3.0		**Force Method:** Clapeyron's theorem	**9**
	3.1	Clapeyron's theorem of three moments, analysis of continuous beam	
	3.2	Beam with sinking of support and variation of EI.	
4.0		**Displacement method :** Slope deflection equation method	**9**
4	4.1	Slope deflection equation method, modified slope deflection equation, analysis of beam	
	4.2	Analysis of beam with sinking of support, variation of EI, Analysis of non-sway frame.	
5.0		**Displacement method:** Moment distribution method	**9**
5	5.1	Moment distribution method, carry over factor, distribution factor, analysis of beam	
	5.2	Analysis of beam with sinking of support, variation of EI, Analysis of non-sway and sway frame	

Text Books

1. Reddy C. S., Basic Structural Analysis, Tata Mc Graw Hill Publications.
2. B. N. Thadani, J. P. Desai, Structural Analysis – A Matrix Approach, Asia Publishing house, Mumbai.

References

1. S. Ramamrutham, R. Narayan, Theory of structures, Danapat Rai publishing company Pvt.Ltd
2. Vazirani & Ratwani, Analysis of Structure, Vol. II, Khanna Publications, New Delhi.
3. Pandit& Gupta, Structural Analysis a Matrix Approach, Tata McGraw Hill Publising Ltd.
4. Negi & Jangid, Structural Analysis, TataMcGraw Hill
5. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli

Internal Assessment (T1, T2 and FET) :

1. T1 should be based on First to Fourth modules, for 10 marks
2. FET shall be assessed for 5 marks separately.

End Semester Examination:

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 07 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCMEM002	Project Management	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UCMEM002	Project Management	-	10	5	15	40%	35	40%	50

Course Description

This course presents the principles and techniques of managing engineering projects from the initiation phase, through planning, execution, control and closeout. Students will develop the analytical skills and awareness necessary on the management side of engineering projects.

Pre-requisites: - NIL

Course Objectives

- To introduce the importance of management in the engineering field, with emphasis on project management, material management, and quality management.
- To equip students with the ability to apply managerial principles for effective planning, resource utilization, and maintaining standards in engineering practice..

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explain**[2] function of principles of management.
- **CO2** **Correlate**[4] knowledge of project management to various engineering project
- **CO3** **Apply**[3] knowledge of material management
- **CO4** **Explain**[2] importance of quality management in engineering field.

Course Contents

Module	Unit	Description	Hours
1.0		**Introduction To Management**	**06**
1	1.1	Principles of Management (Henry Fayol) Functions of Management: Planning- Organizing, Staffing Directing Supervision, Co-ordination, Communication, Motivation, Leading Controlling –Decision Making: Process, introduction to decision tree	
2.0		**Project Management**	**06**
2	2.1	Introduction, Need for Project Management, , The Project Life Cycle, Phases of Project Management, need of project management, Role of Project Manager (PM), Work Breakdown Structure (WBS)	
	2.2	Project Planning- Time Management, Tools for time management Bar Chart/ Gantt Charts, Mile stone chart- representation, uses, progress monitoring.	
3.0		**Project Control-**	**06**
3	3.1	Network analysis- Basic definition application, rules for drawing networks Critical Path Method (CPM)-Development of CPM Network Time Estimates, Calculations of Floats, Critical Path.	
	3.2	Programme Evaluation Review Techniques (PERT)- Time Estimates, Slack calculation , Probability of Project Completion.	
4.0		**Project Monitoring**	**06**
4	4.1	Project Network Updating, - introduction, process, data required for updating, steps in updating application	
	4.2	Cost Control- introduction, project cost. Crashing/compression of network. Application	
5.0		**Material Management and Quality Control**	**06**
5	5.1	Objectives, Need for Inventory Control, EOQ Analysis, ABC analysis, Safety Stock, Purchase Procedure, Stores Record , site layout	
	5.2	Quality Management: Importance, Quality Circle, ISO 9000, QA, QC, QMS –Purpose	

References

1 Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw Hill Publishing Company, New Delhi, 1998.

2 Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015.

3 Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publication

Internal Assessment (T1, T2 and FET)

1. T1 should be based on First to Fourth modules, for 10 marks.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 07 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVVS401	Software Proficiency II	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVVS401	Software Proficiency II	25	40%	25	40%	50

Course Description

This laboratory course provides hands-on training in digital project management using Microsoft Project (MSP). It transitions students from theoretical construction management concepts to practical, software-based scheduling. The course covers the creation of Work Breakdown Structures (WBS), task dependencies, resource allocation, and baseline tracking. Students will learn to analyze project timelines, manage construction costs, and generate professional progress reports for site execution.

Pre-requisites: Building Construction Practices, Project Management (Concurrent).

Course Objectives

- To equip students with the software skills required to plan, schedule, and control civil engineering projects.
- To teach students how to define project calendars, establish task relationships to identify the critical path, and allocate labor and material resources effectively.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Configure**[4] project settings, define custom working calendars, and establish a Work Breakdown Structure (WBS) for construction projects.
- **CO2** **Apply**[3] project tasks using predecessor/successor relationships to generate Gantt charts and identify the Critical Path.
- **CO3** **Define**[2] and assign material, labor, and cost resources to tasks, and resolve resource overallocations.
- **CO4** **Explain**[2] project baselines, track actual construction progress, and generate comprehensive Earned Value and tracking reports.

List of Work

1. Setup of project information, custom calendars, and working hours in MS Project.
2. Development of a Work Breakdown Structure (WBS) and task definition for a construction project.
3. Establishment of task dependencies to generate network diagrams and identify the critical path.
4. Creation of a resource sheet and allocation of material, labor, and cost resources to tasks.
5. Execution of resource leveling to resolve labor or machinery overallocations.
6. Saving project baselines and tracking actual site progress against the planned schedule.
7. Generation of project variance reports.
8. Preparation of documentation as per standard industry format

Project Work

1. **Comprehensive Construction Schedule:** Students must independently develop a complete, end-to-end MS Project schedule for a G+1 Residential Building

References

1 Microsoft Project Step by Step (Microsoft Press Official Standard).

2 Construction Project Scheduling and Control by Saleh A. Mubarak (John Wiley & Sons).

3 Project Planning and Control with PERT & CPM by Dr. B.C. Punmia and K.K. Khandelwal (Laxmi Publications).

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be add and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done**.**

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC405	Fluid Mechanics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVPC405	Fluid Mechanics Lab	25	40%	-	-	25

Course Description

The Fluid Mechanics lab course provides students with practical, hands-on experience in observing fluid behavior and measuring flow properties. It bridges theoretical fluid mechanics concepts with physical reality through the calibration of discharge measurement devices, experimental verification of fundamental fluid theorems, and the study of open channel hydraulics.

Pre-requisites: Engineering Mechanics, Engineering Mathematics

Course Objectives

This lab course provides hands-on experience in measuring fluid pressure, calculating flow rates, and understanding energy conservation in fluid systems. The course integrates theoretical knowledge of fluid statics and dynamics with practical application by allowing students to operate hydraulic benches, calibrate Venturimeters and notches, and physically observe flow regimes and open channel behavior.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Operate**[4] pressure measuring devices and accurately compute fluid discharge in closed conduits
- **CO2** Experimentally **verify**[2] Bernoulli's theorem and classify fluid flow regimes (laminar/turbulent) using Reynold's apparatus.
- **CO3** **Calibrate**[4] standard flow measurement devices, including Venturimeters, orifice meters, notches, and weirs.
- **CO4** **Analyze**[4] uniform flow characteristics in an open channel flume and determine the force exerted by fluid jets on vanes.

List of Work

List of Experiments (Minimum 8 to be performed)

1. Measurement of Discharge and Study of Pressure Measuring Devices (e.g., simple and differential manometers).
2. Verification of Bernoulli's Theorem using a converging-diverging conduit.
3. Calibration of Venturi meter and orifice meter to determine the coefficient of discharge.
4. Reynold's Experiment to identify laminar, transitional, and turbulent flow regimes.
5. Establishment of uniform flow in an open channel flume and determination of Chezy's and Manning's constants.
6. Calibration of V-Notch / Rectangular Notch to measure discharge in open channels.
7. Study of Flow over Weirs (Broad-crested or Ogee weir).
8. Impact of Jet on flat and curved stationary vanes to verify the momentum equation.

References

1 Fluid Mechanics and Hydraulic Machines by R.K. Bansal (Laxmi Publications).

2 Hydraulics and Fluid Mechanics Including Hydraulics Machines by P.N. Modi and S.M. Seth (Standard Book House).

3 Fluid Mechanics Lab Manual (Standard Institutional Reference).

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be add and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UCVPC406	Concrete Technology Lab	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		Total (Marks)
		Term Work	Min pass	Marks	Min pass	
UCVPC406	Concrete Technology Lab	25	40%	25	40%	50

Course Description:

This practical course immerses students in the experimental evaluation of concrete and its constituent materials. Students will perform standard laboratory tests on cement, fine aggregates, coarse aggregates, and both fresh and hardened concrete to ensure compliance with industry codes. The lab culminates in designing and testing a custom concrete mix.

Pre-requisites: Basic Construction Practices, and concurrent enrollment in Concrete Technology (UCVPC402).

Course objectives:

- To conduct standard quality control tests on cement, sand, and coarse aggregates to ascertain their suitability for construction as per IS codes.
- To evaluate the workability of fresh concrete using standardized methods like the slump, compaction factor, and Vee-Bee tests.
- To design a specific concrete mix and determine the mechanical properties of the hardened concrete through both destructive and non-destructive testing (NDT).

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explain**[2] the importance of testing of cement and its properties
- **CO2** **Determine**[2] the different properties of aggregate
- **CO3** **Explain**[2] the concept of workability and testing of concrete
- **CO4** **Describe**[2] the properties of hardened concrete

The students are expected to perform following experiments:

1. **Test on Cement:** fineness, Standard Consistency, Setting Time, Compressive Strength and Soundness Test.
2. **Test on Aggregate**: Specific Gravity, Grading of Aggregate, Flakiness Index, Elongation Index, Impact Value, Abrasion Value, Crushing Value, Alkali Aggregate Reaction, Fineness Modulus, Bulking of Sand.

3. **Test on Fresh Concrete:** Slump, Vee-Bee, Compaction Factor and Flow Test.
4. **Concrete Mix Design:** Concrete mix design by ACI 211.1-91, IS 10262- 2009 and IS 456.
5. **Test on Hardened Concrete:** Split Tensile Test, Compressive Strength, Modulus of Rupture, Rebound Hammer Test and Ultrasonic Pulse Velocity.

References

1. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
2. Shetty M. S, "Concrete Technology", S. Chand and Company Ltd, New Delhi, 2003

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
USTVE006	AI in Civil Engineering	Theory	Practical	Tutorial	Theory	Practical	Tutorial
		03	-	-	03	-	-

Evaluation Scheme :

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		Total (Marks)
USTVE006	AI in Civil Engineering	T1	T2	FET	Total	Min pass	Marks	Min pass	
		10	10	5	25	40%	50	40%	75

Course Description

This course introduces the application of Artificial Intelligence (AI) in civil engineering for solving complex problems in planning, design, construction, and infrastructure management. It covers basic concepts of machine learning, data analysis, and intelligent decision-making, with applications in transportation, structural health monitoring, and construction management. The course also highlights emerging technologies like deep learning and smart infrastructure systems.

Pre-requisites: -Basic computer knowledge.

Course Objectives

- To introduce the fundamental concepts of Artificial Intelligence, Machine Learning, and Deep Learning in the context of civil engineering applications.
- To equip students with the skills to formulate optimization problems and solve them using mathematical and AI-driven methodologies.
- To apply AI techniques practically to domains such as structural health monitoring, construction scheduling, and infrastructure predictive maintenance.

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

- **CO1** **Describe**[1] the fundamentals of Artificial Intelligence and its relevance to civil engineering.
- **CO2** **Understand**[2] optimal problem formulation for a given problem and learn to solve it using traditional optimization methods.
- **CO3** **Apply**[3] AI algorithms to solve problems in civil engineering.
- **CO4** **Develop**[3] skills to apply AI algorithms for solving problems in civil engineering.

Course Contents

Module	Unit	Description	Hours
1.0		**Introduction to AI in Civil Engineering**	**09**
	1.1	Fundamentals of Artificial Intelligence in Civil Engineering Introduction to Artificial Intelligence, Machine Learning, and Deep Learning, Role of AI in Civil Engineering Domains	
2.0		**Basics of Optimisation in Engineering Design**	**09**
	2.1	Optimisation problem formulation in civil engineering, Objective function, decision variables, Graphical optimisation, linear programming, simplex method	
3.0		**Structural Analysis and Design Optimization**	**09**
	3.1	Application of AI/ML in Structural Analysis Design Optimization Techniques using Genetic Algorithms and Neural Networks,	
	3.2	Case Studies: Predictive Maintenance and Optimal Design Solutions, Structural health monitoring with AI techniques, Case studies:	
4.0		**Introduction to construction management with AI**	**09**
	4.1	Introduction to construction management, Schedule optimization using ML algorithms, Resource allocation, and risk management With AI, Predictive analytics for infrastructure maintenance	
	4.2	Case studies: AI-driven construction project management systems	
	4.3	Application of AI and machine learning in supply chain logistics for construction materials, site safety monitoring using computer vision, and the integration of autonomous equipment on construction sites.	
5.0		**Artificial Neural Networks**	**09**
	5.1	Artificial Neural Networks and Deep Learning in Civil Engineering, Introduction to Artificial Neural Networks	

References

1. Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
2. Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley
3. Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications By S. Rajshekharan, G. A. Vijayalakshmi Pai, PHI

Internal Assessment (T1, T2 and FET)

1. T1 should be based on the first two modules, and T2 should be based on the next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 50 marks and comprise 5 questions, each carrying 10 marks
2. The duration of end semester examination shall be two hours.
3. The students need to solve all the questions.
4. Question No.1 will be compulsory and based on the entire syllabus.
5. The remaining questions (Q.2 to Q.5) will be selected from all the module