STRENGTH OF MATERIALS			
Course Code	**24CV31**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:2:0	**SEE Marks**	50
Credits	04	**Total Marks**	100
Contact Hours	40+15	**Exam Hours**	3 Hrs.
Examination type (SEE)	Theory		

Prerequisites:
The students should have knowledge on:

- Engineering Mechanics (Statics, Friction and properties of areas and volumes)
- Basic Mathematics (Calculus, Algebra and Trigonometry)

Course objectives:

- Understand the simple stresses, strains, and compound stresses in various structural components.
- Understand the bending moments and shear forces in different types of beams under various loading conditions
- Know the bending stress, shear stress, and torsional stress in beams and shafts with different cross sections
- Understand the deflection in beams and the stability of columns under different loading conditions.
- Understand the behaviour and strength of structural elements subjected to compound stresses and stresses in thin and thick cylinders.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1

Simple Stresses and Strains: Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants. Thermal stresses and strains, Compound bars subjected to thermal stresses, state of simple shear.

(L1, L2, L3)

Text Book: 1 Chapter 1: 1.1 to 1.10, Chapter 2: 2.1 to 2.24, Chapter 3: 3.1 to 3.15

Module-2
Bending moment and shear force diagrams in beams: Introduction to types of beams, supports and loadings. Definition of shear force and bending moment, sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, development of Shear Force Diagram(SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads, UDL (Uniformly Distributed Load), UVL (Uniformly Varying Load), Couple and their combinations **(L1, L2, L3)** **Text Book:1** Chapter 9: 9.1 to 9.11
Module-3
Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections. **Torsion in Circular Shaft:** Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft. **(L1, L2, L3)** **Text Book: 1**Chapter 10: 10.1 to 10.14
Module-4
Deflection of Beams: Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment- curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple. **Columns and Struts:** Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns. **(L1, L2, L3)** **Text Book:1 Chapter** 12: 12.1 to 12.12
Module-5
Compound Stresses: Introduction, state of stress at a point, General two-dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses **Thin and Thick Cylinders:** Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lame's equation, radial and hoop stress distribution. **(L1,L2,L3)** **Text Book:1** Chapter 23: 23.1 to 23.11, Chapter 24: 24.1 to 24.13

Course outcome (Course Skill Set)

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

1. Evaluate the simple stresses, strains and compound stresses (PO – 1,3,6 PSO – 1,2)
2. Calculate the Bending moments, shear force and draw BMD, SFD for various types of beams and loadings ((PO – 1,2,7,10 PSO – 1,2)
3. Analyse the bending stress, shear stress and torsional stress in beams and shafts with different cross sections (PO – 2,6,8,9 PSO – 1,2)
4. Evaluate the deflection in beams and determine the stability of the columns. (PO – 2,4,5,7,11 PSO – 1,2)
5. Evaluate the behaviour and strength of structural elements under the action of compound stresses and stresses in thin and thick cylinders. (PO – 3,6,7,8,10,12 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Books

- B.C Punmia Ashok Jain, Arun Jain, "Strength of Materials", Laxmi - 2018-22 Publications, 10th Edition-2018

Reference Books

- R K Bansal, "A Textbook of Strength of Materials", 4th Edition, Laxmi Publications, 2010
- S.S. Rattan "Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013).
- Vazirani, V N, Ratwani M M. and S K Duggal "Analysis of Structures Vol. I", 17th Edition, Khanna Publishers, New Delhi.
- R.K. Rajput, "Strength of materials" S. Chand Publishing (6th Edition)
- S S Bhavikatti, "Strength of Materials" Vikas Publishing (5th Edition)
- B.S. Basavarajaiah, P. Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition,2010

Web links and Video Lectures (e-Resources):

1. Strength of Materials web course by IIT Roorkee https://nptel.ac.in/courses/112107146/
2. Strength of Materials video course by IIT Kharagpur https://nptel.ac.in/courses/105105108/
3. Strength of Materials video course by IIT Roorkee https://nptel.ac.in/courses/112107147/18
4. All contents organized http://www.nptelvideos.in/2012/11/strengthof-materials-prof.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quiz (To assist in GATE Preparations)
- Demonstrations in Lab
- Virtual Lab Experiments

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped, 2: Moderately Mapped 3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

WATER SUPPLY AND WASTEWATER ENGINEERING			
Course Code	**24CV32**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:2:0	**SEE Marks**	50
Credits	04	**Total Marks**	100
Contact Hours	40+15	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

1. Basic Environmental Engineering Concepts
2. Applied Chemistry
3. Awareness of Public Health and Environmental Issues
4. Mathematical Skills

Course objectives: This Course will enable the students to

- Analyze the variation of water demand and to estimate water requirement for a community.
- Study drinking water quality standards and to illustrate qualitative analysis of water.
- Analysis of physical and chemical characteristics of water and wastewater.
- Understand and design of different unit operations and unit process involved in water and wastewater treatment process
- Design various oxidation processes.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching
4. Integration of Industry Examples

Module-1

Introduction: Water: Need for protected water supply, Demand of Water: Types of water demands - domestic demand, industrial, institutional and commercial demand, public use and fire demand estimation, factors affecting per capita demand, Variations in demand of water, Peak factor.

Design period and factors governing design period. Methods of population forecasting and numerical problems. Physico chemical characteristics of water Sampling. **L1, L2, L3**

Text Book: Chapter-1:1.1 Chapter-2: 2.1 to 2.10

Module-2

Water Treatment: Objectives, Unit flow diagrams – Significance of each unit, Aeration process Limitations and types.

Sedimentation - Theory, settling tanks, types and design with numerical, Coagulation and flocculation, types of coagulants.

Filtration: Mechanism, theory of filtration, types of filters: slow sand, rapid sand and pressure filters. Operation and cleaning. Design of slow and rapid sand filter without under drainage system, Numerical. **L1, L2, L3**

Text Book: Chapter-9:9.13 to 9.22

Module-3

Disinfection: Methods of disinfection with merits and demerits. Breakpoint chlorination, Softening: Lime soda and Zeolite process.

Wastewater: Introduction: Need for sanitation, methods of sewage disposal, types of sewerage systems, Treatment of municipal waste water: Waste water characteristics sampling, significance and techniques, physical, chemical and biological characteristics, Numerical on BOD.

L1, L2

Text Book: Chapter-9:9.23-9.26

Module-4

Treatment Process: Flow diagram for municipal waste water Treatment unit operations and process Screens: types, disposal. Grit chamber, oil and grease removal. Design of Primary and secondary settling tanks, Numerical.

Suspended growth system - Conventional activated sludge process and its modifications, Numerical.

L1, L2, L3

Text Book: Chapter- 9:9.4-9.12

Module-5

Attached growth system – Trickling filter, Numerical on Trickling filters, bio-towers and rotating biological contactors. Principle of stabilization ponds, oxidation ditch. Sludge digesters (aerobic and anaerobic), Equalization. Thickeners and drying beds.

L1, L2, L3

Text Book Chapter-9: 9.27

Course outcome (Course Skill Set)

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

CO1: Estimate the average and peak water demand for a community. (PO – 1,2 PSO – 1,2)

CO2: Evaluate water quality and environmental significance of various parameters and plan suitable treatment system. (PO – 1,2,3,7 PSO – 1,2)

CO3: Design the different units of water treatment plant. (PO – 1,2,3, PSO – 1,2)

CO4: Design the various units of wastewater treatment plant. (PO – 1,2,3, PSO – 1,2)

CO5: Design of various AOPs and low-cost treatment units. (PO – 1,2,3, PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test

component.

- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources: Text books

- Howard S. Peavy, Donald R. Rowe, George T, "Environmental Engineering" - Tata McGra Hill, New York, Indian Edition, 2013
- S. K. Garg, Environmental Engineering Volume-I, Water supply Engineering – M/s Khanna Publishers, New Delhi2010
- B.C. Punmia and Ashok Jain, Environmental Engineering I-Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi2010.
- B C Punmia, "Environmental Engineering volume-II", Laxmi Publications 2nd, 2016
- Karia G.L., and Christian R.A, "Wastewater Treatment Concepts and Design Approach", Prentice Hall of India Pvt. Ltd., New Delhi. 3rd, Edition, 2017
- S.K.Garg, "Environmental Engineering vol-II, Water supply Engineering", Khanna Publishers, – New Delhi, 28th edition and 2017
- CPHEEO Manual on water supply and treatment engineering, Ministry of Urban Development, Government of India, New Delhi.

Mark.J Hammer, Water & Waste Water Technology, John Wiley & Sons Inc., New York,2008

Web links and Video Lectures (e-Resources):

Lecture 01: Background and Course Introduction https://youtu.be/yDnrv-oGSBc Lecture 02: Water Sources and Availability https://youtu.be/K4Vty0cmybI Lecture 03: Water Uses https://youtu.be/9H7dPkWOsjA
Lecture 04: Water Supply Key Issues and Concerns https://youtu.be/JueYGPbsflw
Lecture 05: Urban water services and water supply systems https://youtu.be/bCKm9KkcQtw Lecture 06: Urban water services and water supply systems https://youtu.be/s0hy0ZlM1bA Lecture 07: Components of Water Demand https://youtu.be/mVmErXpIp64
Lecture 08: Fluctuations in Water Demand https://youtu.be/qXUwy5OnX9Q
Lecture 09: "Concept of Design Period and Design Population Need to Forecast Population Population Forecasting Methods https://youtu.be/QyLdA_qhUog Lecture 10: Demand Forecasting and Design Capacities https://youtu.be/rKTwjvx7E8A
Lecture 11: Water Sources and Collection of Water https://youtu.be/TvEGgZw1El4 Lecture 12: Surface Water Intakes https://youtu.be/GcQOyAdG5OM
Lecture 13: Surface Water Intakes Systems https://youtu.be/r1oJtm_SXz4
Lecture 14: Groundwater Intake https://youtu.be/Zo1p7uRDEmM
Lecture 15: Well Interferences, Well losses and Efficiency https://youtu.be/dRU5M_WICU0 Lecture 16: Raw water Conveyance and Pumping https://youtu.be/iQwEoEhujTc
Lecture 17: Practice Problems https://youtu.be/e5bduQiz5NY Lecture 18 : Raw Water Storage https://youtu.be/WZlI7kWoUjE
Lecture 19 : Treated Water Storage https://youtu.be/BuZ48afjd04
Lecture 20 : Placement, Design and Construction of Storage Reservoirs https://youtu.be/nQCZbXaBb1o
Lecture 24 : Philosophy of Water Treatment https://youtu.be/6I-eBqE7Hew Lecture 25 : Water Treatment Units Screening and Aeration https://youtu.be/QsWp_HIZqPs
Lecture 26 : Water Treatment Units Sedimentation https://youtu.be/T1M4Ecjwq7Q Lecture 27 : Practice Problems On Sedimentation https://youtu.be/Zlh2mpOjIMU Lecture 28: Coagulation and Flocculation: Theory https://youtu.be/aAo2bBaF0vU
Lecture 29: Coagulation and Flocculation: Selection and Application https://youtu.be/44p0lN31ogo
Lecture 30: Coagulation and Flocculation: Design Operation and Process Control https://youtu.be/v0TDfCz_jLU Lecture 31: Filtration Theory and Slow Sand Filters https://youtu.be/nuJQe9F_2zI
Lecture 32: Rapid Sand Filter: Filter Media and Components https://youtu.be/3qw3sKcuQlY Lecture 33: Rapid Sand Filters and Pressure Filters https://youtu.be/PEX_0DebrSQ
Lecture 34: Practice Problems Coagulation Flocculation and Filtration https://youtu.be/73jxsBCDuq4 Lecture 35: Disinfection Basic https://youtu.be/d4UG9Xivuik
Lecture 36: Chlorination https://youtu.be/L3eSkeOU3jY

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Activity Based Learning (Suggested Activities in Class)/ Practical Based learning http://nptel.ac.in
- https://swayam.gov.in
- https://www.vlab.co.in/participating- institute-amrita-vishwa-vidyapeetham

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped,1: Low Mapped, 2: Moderately Mapped3: Highly Mapped
Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

ENGINEERING GEOLOGY			
Course Code	**24CV33**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on:

- Basic divisions of Earth's Interior
- Different Minerals and Rocks available on Earth
- Basics of Weathering and Origin of Rocks
- Mechanical attributes of rock strata and soil layers

Course objectives:

- To inculcate the importance of earth's interior and application of Geology in civil engineering in Geo Hazard mitigation and management
- To create awareness among Civil engineers regarding the resources of earth
- To provide knowledge on dynamic Geology and its importance in modifying the physical character of rocks which cause rocks suitable or unsuitable in different civil engineering projects such as Dams, bridges, tunnels and highways.
- To educate the ground water management regarding diversified geological formations, . To highlight the concept of rain water harvesting.
- To understand the application of Remote Sensing and GIS, Natural disaster and management and environmental awareness. To understand the subsurface using geospatial data
- To provide decision support on the nature of the basic raw materials used in construction. To provide decision support on Lithological characters and subsurface conditions
- To describe various geological maps and interpretation of geological data for mining and subsurface investigations.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1	**7Hours**

Introduction, the scope of earth science in Engineering.

Earth's internal structure and composition, internal dynamics and Plate tectonics, Earthquakes - types, causes, so-seismic lines, seismic zonation, seismic proof structures. Volcanic eruption - types, causes. Landslides-causes types, preventive measures; Tsunami – causes, consequences, mitigation. Cyclones - causes and management. **L1, L2**

Text Book: Chapter 2: 2.3 to 2.5

Module-2 **5 Hours**

Earth Materials in Construction

Minerals -Industrial, rock-forming and ore minerals. Physical properties, composition. Rocks Types, structure/Texture, mineral composition occurrence, properties.

Decorative (facing/polishing), railway ballast, rocks for masonry work, monumental/architecture, Dressing of stones, Requirement of good building stones.

L1, L2

Text Book: Chapter 9: 9.1 to 9.3, Chapter 11: 11.1 to 11.14, Chapter 12: 12.1 to 12.10, Chapter 13: 13.1 to 13.9, Chapter 14: 14.1 to 14.12

Module-3 **7Hours**

Earth Surface process and Resources

Weathering, type, causes, soil insitu, drifted soil, soil profile, soil mineralogy, structure, types of soil, Black cotton soil v/s Lateritic soil; effects of weathering on monumental rocks. Soil Horizon, Soil Classification by Grain Size.

L1, L2

Text Book: Chapter 3: 3.1 to 3.2

Module-4 **7 Hours**

Surface and sub investigation for deep foundation

Dip and strike, and outcrop problems (numerical problem geometrical/ simple trigonometry based), Borehole data (and problems), Faults, folds, unconformity, joints, types, recognition and their significance in Civil engineering projects like tunnel project, dam project, Reservoir site.

L1, L2, L3

Text Book: Chapter 6: 6.1 to 6.9 Chapter 7: 7.1 to 7.14

Module-5 **5 Hours**

Modern Tools and geophysical methods

Rocks as aquifers, water-bearing properties igneous, sedimentary and metamorphic rocks, coefficient of permeability, factors affecting permeability, Electrical Resistivity meter, depth of water table, (numerical problems), seismic studies.

L1, L2,L3

Text Book: Chapter 18: 18.1 to 18.13, Chapter 22: 22.1 to 22.8

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

CO1: Apply geological knowledge in different civil engineering practice. (PO – 1,2,3,4,6,7 PSO – 1,2)

CO2: Acquire knowledge on durability and competence of foundation rocks, and will be able to use the best building materials. (PO – 1,2,3,4,6,7 PSO – 1,2)

CO3: Students will become competent enough for the safety, stability, economy and life of the structures that they construct (PO – 1,2,3,4,5,6,7 PSO – 1,2)

CO4: Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems (PO – 1,2,3,4,5,6,7 PSO – 1,2)

CO5: Students will become Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering for safe and solid construction. (PO – 1,2,3,4,5,6,7 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

4. The question paper will have ten questions. Each question is set for 20 marks.
5. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
6. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Note: Subject to be taught by Geologist with qualification M. Sc Geology/MPhil/ Ph. D in Geology

Suggested Learning Resources:

Text Book:

1. Parbin Singh, A text book of Engineering and General Geology, 7th Edition, S K Kataria and Sons, 2004

Reference Books

1. Principles of Engineering Geology, by KVGK Gokhale, BS Publications
2. A textbook of Engineering Geology by Chenna Kesavulu, Mac Millan India Ltd
3. Principle of Engineering Geology, by K.M. Bangar, Standard publishers

- https://www.youtube.com/watch?v=aTVDiRtRook&list=PLDF5162B475DD915F
- https://www.youtube.com/watch?v=EBiLLJAxBuU&index=2&list=PLDF5162B475DD915F
- https://www.youtube.com/watch?v=sTY-ao4RZck&list=PLDF5162B475DD915F&index=3
- https://nptel.ac.in/courses
- https://youtu.be/fvoYHzAhvVM
- https://serc.carleton.edu/NAGTWorkshops/hazards/events/12262004.html?serc_source = recommendation
- https://serc.carleton.edu/NAGTWorkshops/coursedesign/goalsdb/14712.html
- https://www.earthsciweek.org/classroom-activities
- NPTEL materials

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped,2: Moderately Mapped3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

ENGINEERING SURVEY			
Course Code	**24CV34**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:2	**SEE Marks**	50
Credits	04	**Total Marks**	100
Contact Hours	40 hours Theory + 15 Lab slots	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Introduction to Civil Engineering
- Basic Mathematics
- Fundamentals of Physics
- Drawing and Mapping Skills

Course Objectives:

- Ability to understand principles of both traditional and modern surveying applying knowledge of mathematics.
- Ability to handle surveying equipment's and software tools to carry out field surveying, plot topographical Drawings and construction drawing
- Ability to use Total station for data capture, data storage, data transfer.
- Ability to prepare construction drawing and setting out

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching
4. Hands-On Practice and Field Exposure

MODULE-1

Engineering surveying – Definition & importance of surveying for Civil Engineers. Surveying types- Control survey, Topographical surveying, Construction Survey, Cadastral survey, Hydrographic survey and Underground Survey. Surveying through the ages- Chain surveying, Compass surveying and Plane Table Surveying (concepts and limitations only).

Measurement of Distance- Various types of tapes, Laser distance meter, Distance measuring wheel, Electronic Distance measurement, GPS. **L1, L2, L3**

Text Book 1: Chapter 1: 1.1 to 1.10, Chapter 4: 4.1 to 4.5, Chapter 5: 5.1 to 5.8, Chapter 11: 11.1 to 11.4, Chapter 24: 24.1 to 24.4

MODULE-2

Vertical Control- Concepts of various types of Datum – Mean Sea level, Bench marks – Temporary and Permanent.

Levelling- Terms used in levelling, Setting up of Dumpy level. Differential levelling by plane of collimation method using Dumpy level.

Theodolite Surveying – Terms used in Theodolite surveying. Setting up a Theodolite. Measurement of horizontal and vertical angles with Theodolite.

Total Station Surveying – Features, parts, accessories and advantages of Total Station. Surveying with total station – Measurement of Horizontal angle, vertical angle, distance, slope, vertical distance, multiple angles with Total station. Using Total station for Area measurement and Volume calculation. **L1, L2, L3**

Text Book 1: Chapter 9: 1.1 to 9.8, Chapter 6: 6.1 to 6.6, Chapter 12: 12.1 to 12.2, Chapter 13: 13.1.1 to 13.4,

Chapter 24: 24.1 to 24.8

MODULE-3

Contours - Definition, terms used, characteristics of contours and applications of contours in civil engineering practice. Contouring using level, theodolite and total station. Plotting of contours in CAD. **Longitudinal and cross sectioning –** Definition, importance of L/S & C/S. L/S & C/S using level, theodolite and Total station. Plotting of L/S & C/S in CAD.

Coordinate survey with Total station - Measurement of coordinates using total station. Creating Job files, importance of back sight data, coordinate data recording. Data transferring, data refinement and plotting in CAD. **L1, L2, L3**

Text Book 1: Chapter 10: 10.1 to10.7, Chapter 9: 9.14 to 9.15

MODULE-4

Curves –Types of Curves- Application of curves in civil engineering. Setting out of Horizontal curve by Theodolite (Rankine's method) and using Total Station. Components of Compound, Reverse curve. Transition Curve and Combined curve. Various types of vertical curves and its applications.

Areas and Volumes- Methods of determining areas by trapezoidal and Simpsons' rule. Measurement of volume by prismoidal and trapezoidal formula. Earthwork volume calculations from spot levels and from contour maps; Earthwork calculation in Embankments.

Construction Surveying - Setting out works using Total Station, Setting out buildings by Centre line method. **L1, L2, L3, L4**

Text Book 1: Chapter 12: 12.1 to 12.7, Chapter 13: 13.1.1 to 13.8

Text Book 2: Chapter 1: 1.1 to 1.6, Chapter 2: 2.1 to 2.5

MODULE-5

GPS Surveying – Introduction. Overview of GPS system- space, control and user segments. Reference co- ordinate systems. Absolute and Differential positioning with GPS. Gagan system in India. Types of GPS Receivers. Engineering survey using Differential GPS.

Surveying with Drone – Introduction, applications and advantages. Features of photogrammetric mapping method. Drone surveying requirements- Drone platform, Flight planning software, Sensor DGPS equipment and Image processing software. Types of drones and sensors. Process of drone surveying – flight planning, DGPS markers, capturing images, post processing of images using photogrammetry software and output maps.

Application and uses of Remote sensing and GIS in engineering surveying. **L1, L2, L3, L4**

Text Book 3: Chapter 5: 5.1 to 5.11

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	Use of Various types of tapes, Laser distance meter, Distance measuring wheel.
2	Differential levelling by Dumpy level by plane of collimation method
3	Measurement of horizontal and vertical angles by Theodolite. Method of repetition
4	Setting out simple curve using Rankine's method using Theodolite
5	Setting out central line of a small residential building.
6	Setting up of Total station. Features and components of Total station
7	Measurement of Distance, slope, vertical distance, horizontal and vertical angles using Total station
8	Coordinate measurement with Total station
9	Longitudinal sectioning and cross sectioning using Total station
10	Contouring and plotting with Total station
11	Demonstration of Equipment's used for chain, compass and plane table surveying
12	Visit to railway station/ large construction site to understand the importance of datum and benchmark.

Course outcomes (Course Skill Set):

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

CO1: Summarize various types of surveying and carry out distance measurement using various equipment's (PO – 1,2,5 PSO – 1,2)

CO2: Illustrate the use and applications of levelling and theodolite (PO – 1,2,5,6 PSO – 1,2)

CO3: Plot contours, longitudinal and cross sections for construction projects. (PO – 1,2,3, 5 ,6 PSO – 1,2)

CO4: Set curves for construction works and carry out estimation of areas and volumes. (PO –1,2,5 ,6 PSO – 1,2)

CO5: Demonstrate the necessary skills to carry out GPS and DRONE Surveying (PO-1,2,5, PSO-1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Textbook:

1. Punmia BC, & Jain Ashok Kumar. (2016). *Surveying* (Vol. 1). Laxmi Publications.
2. Punmia BC, & Jain Ashok Kumar. (2016). *Surveying* (Vol. II). Laxmi Publications.
3. Punmia BC, & Jain Ashok Kumar. (2016). *Surveying* (Vol. III). Laxmi Publications.

Reference Books:

1. Dr. K.R. Arora. (2019). *Surveying* (17th ed., Vol. 1). Standard Book House.
2. Charles D Ghilani (2012) (13th ed.). Prentice Hall

Web links and Video Lectures (e-Resources):

1. https://enterprise.dji.com/surveying/land-surveying
2. https://www.gps.gov/applications/survey/
3. https://www.constructionplacements.com/total-station-in-surveying-types-uses-and- applications/
4. https://www.youtube.com/watch?v=bbs5AEPstl4
5. https://www.youtube.com/watch?v=KHI4TEeexuM&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1t B&index=28
6. https://www.youtube.com/watch?v=Iu9vrE48_I4&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1tB &index=30
7. https://www.youtube.com/watch?v=RXUi2cX4CkU
8. https://www.youtube.com/watch?v=SVa66vO08So

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Hand on use of various surveying instruments
2. Surveying Civil engineering block and plotting with instruments of student's choice
3. Setting out a single bedroom house plan in field

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped, 2: Moderately Mapped 3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

COMPUTER AIDED BUILDING PLANNING AND DRAWING			
Course Code	**24CVL35**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:0:2	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	30	**Exam Hours**	3
Examination type (SEE)	Practical		

Prerequisites:

The students should have knowledge on

- Basic Knowledge of Building Components
- Fundamentals of Building Planning
- Basic Computer Skills
- Engineering Drawing
- Introduction to CAD Software (e.g., AutoCAD)

Course objectives:

- Gain skill set to prepare Computer Aided Engineering Drawings using a software
- Understanding the details of construction of different building elements
- Visualize the completed form of the building and the intricacies of construction based on the engineering drawings
- Get familiarization of practices used in Industry.

Sl.NO	Experiments
1	**Drawing Basics:** Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS:962.
2	**Drawing Tools:** Lines Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse, Modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet,
3	**Using Text:** Single line text, Multiline text, Spelling, Edit text
4	**Special Features:** View tools, Layers concept, Dimension tools, Hatching, Customizing Toolbars, Working with multiple drawings.
5	**Drawings of Different Building Elements:** Refer NBC before practice a> Footing/ Foundation – Foundation dimension for Isolated, combined footing, Standard dimension and cross section of footing b> Size stone Masonry – Size of single and double bond stone, Sections at wall foundation c> Brick Masonry – Size of standard Burnt Brick, Solid Cement Block, Hollow Cement block, Other bricks used in current practice
6	Principles of planning, Planning regulations and building bye-laws, factors affecting site selection, Functional planning of residential and public buildings, design aspects for different public buildings. Recommendations of NBC.

7	Draw a building plan for single and double bed room accommodation for a given site dimension. Students have to go through Building Bye Laws and regulations
8	Prepare the centre line drawing for marking the single and double bedroom house as in in exercise 6
9	Prepare a complete sanction plan for the exercise 6 as per the bye law. Also study the requirements to plan Residential Building, School building, Hospital Building, Offices
10	Drawing of plan with electrical, plumbing and sanitary services using CAD software
11	Drawing standard sections for Lintel and chajja, RCC Slabs, Columns and beams.
12	Drawing different types of staircases – Dog legged, Open well – plan and section

Course outcomes (Course Skill Set):

CO1: Prepare, read and interpret the drawings in a professional set up. (PO – 1,2,5 PSO – 1,2)

CO2: Know the procedures of submission of drawings and Develop working and submission drawings for building. (PO – 1,2,5 PSO – 1,2)

CO3: Plan of residential or public building as per the given requirements. (PO – 1,2,5 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted

between the schedule mentioned in the academic calendar of the University.

- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

- MG Shah, CM Kale, SY Patki, "Building drawing with an integrated approach to Built Environment Drawing", Tata McGraw Hill Publishing co. Ltd, New Delhi.
- Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New Delhi.
- Malik RS and a Meo GS, "Civil Engineering Drawing", Asian Publishers/Computech Publication Pvt Ltd

RURAL, URBAN PLANNING AND ARCHITECTURE			
Course Code	**24CV36A**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	40	**Total Marks**	100
Contact Hours	03	**Exam Hours**	03
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Understanding of fundamental civil engineering concepts
- Familiarity with topographical maps and land use patterns
- Exposure to environmental and socio-economic aspects of development
- Awareness of sustainable development and infrastructure planning principles

Course objectives:

- To make the student understand about the past and present architecture of different parts of the world
- Rural and urban planning and growth and circulation of patterns and effect of increase in urbanization
- The basic planning required for urban and rural centres with respect to physical and social aspects
- Student s to visit the different place of architecture monuments to understand the concept
- To understand different types of architecture and planning

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8 Hours**

Introduction: Aim and importance of Architecture, Architecture as a fine art. Role of an architect and an engineer. Essential principles and qualities of architecture with examples
Factors of architecture: Mass, Form, Colour, Solids, and Voids, Uniformity, Balance and Symmetry, Painting with examples.

L1, L2

Module-2 **8 Hours**

Architectural influence of the following: Association, Tradition, Climate, Materials, Topography, Religion social customs and aspiration of time.

Architectural characteristics of the following architecture with examples. 1. Egyptian, 2. Greek, 3. Roman, 4. Buddhist, 5. Hindu, 6. Jain, 7. Chalukyan, 8. Modern architecture

Factors that have influence present day Modern Architecture, Aesthetic difference between the past and present Architecture.

Students are advised for a technical tour related Architecture and town planning to gain additional knowledge in this subject

L1, L2

Module-3 **8 Hours**

Human settlements, Rural and urban pattern of growth, Factors that promote growth and development of Rural and urban areas

Ancient Town Planning in India: Principles of town planning and circulation pattern with examples

L1, L2

Module-4 **8 Hours**

Industrialization: Impact on town planning, Urbanisation causes, its effect on town and cities, remedial measures both in urban and rural planning. Circulation pattern in cities: Urban roads and streets, their functional classification, traffic survey data and its use in town planning

L1, L2

Module-5 **8 Hours**

Contemporary objectives and methods of planning of town: Development plans for cities, objectives and stages involved in their preparation and implementation, space standards for planning.

L1, L2

Course outcome (Course Skill Set)

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

CO1: Understand importance of architecture in rural and urban planning (PO – 1,2 PSO – 1,2)

CO2: Understand Influence of architecture (PO – 1,2, PSO – 1,2)

CO3: Design infrastructure for rural and urban region (PO – 1,2,3 PSO – 1,2)

CO4: Plan and design rural and urban roads (PO – 1,2,3 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

FIRE SAFETY IN BUILDINGS			
Course Code	**24CV36B**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	03
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic understanding of building construction and structural systems
- Knowledge of building materials and their fire-resistance properties
- Familiarity with architectural design and building layout concepts
- Awareness of fundamental safety regulations and building codes
- Exposure to mechanical, electrical, and plumbing (MEP) systems

Course objectives:

- To understand the importance fire safety
- To learn various techniques involved in fire safety
- To design fire resistant buildings using proper materials and methods

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1	**8 Hours**
Fire: Introduction, Basic concepts of fire protection, Fire as a process of combustion, planning for fire protection, fire resistance Ventilation and fuel-controlled fire, process of combustion: flashover condition, effect of fire on construction material, design of fire resistance steel structure, concrete structure	**L1, L2**
Module-2	**8 Hours**
Fire safety: urban planning, escape and refuge, internal planning, detection and suppression Introduction to lift design, design of lift system, expected stop and floor of reversal, different cases, simulation, arrangements and escalators	**L1, L2**
Module-3	**8 Hours**
Introduction to flow system: water supply, constant demand, variable demand and diversity factor, control systems Flow in pipe networks and fixture units, design of water supply distribution system, flow in waste water pipes	**L1, L2**
Module-4	**8 Hours**

Introduction to HVAC: governing equations to HVAC process, numerical problem on HVAC system, psychometric chart, equation based approach Electrical systems: design of electrical systems, intelligent building, life cycle cost and basics of building maintenance, stages of maintenance management, planning for building maintenance, periodicity of maintenance management, estimation of repair cycle, cost profile of maintenance, lamp replacement, building inspection, planned and Ad-hoc maintenance

L1, L2

Module-5 **8 Hours**

Condition survey and health evaluation of buildings, diagnosis of building by visual survey, case studies of visual survey, effect of corrosion and alkali aggregate reaction, sampling and choice of test location Non-destructive testing, core strength test, carbonation and chloride measurement, electrical method of progress measurement Repair, rehabilitation, retrofit, periodicity and economics of condition survey, interpretation of test results

L1, L2

Course outcome (Course Skill Set)

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

CO1: Understand types of fire, combustion process and fire resistance (PO – 1,2 PSO – 1,2)
CO2: Plan for fire safety and design of lifts (PO – 1,2,3 PSO – 1,2)
CO3: Design flow network in buildings (PO – 1,2,3 PSO – 1,2)
CO4: Design of electrical systems and maintenance (PO – 1,2,3 PSO – 1,2)
CO5: Perform health evaluation of buildings and suggest remedies (PO – 1,2,3 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
-

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question

papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. J A Purkiss, Fire Safety Engineering: Design of Structures, ISBN 13 978-8131220085, Elsevier, 2009
2. V K Jain, Fire Safety in Buildings, ISBN-13 978-938980219, New Age International Private Limited; Third edition, 2020
3. Fire protection, services and maintenance management of building, NPTEL video lecture, IIT, Delhi
4. Bureau of Indian Standards, " Hand Book Of Functional Requirements Of Buildings, (SP-41 & SP- 32)", BIS 1987 and 1989.
5. Markus,T.A. & Morris, E.N., "Building Climate and Energy" Pitman publishing limited. 1980.
6. Croome,J.D .& Roberts,B.M., "Air Conditioning and Ventilation of Buildings, Vol-1".Pergamon press.
7. Building Services Design - T.W.Mever
8. Building Engineering & System Design - F.S.Merrit & J. Ambrose
9. SP-35 (1987): Handbook of Water supply & drainage-BIS

N.B.C.-2007 BIS

11. Concept of building fire safety - D.Egan.
12. Design of fire resisting structures - H.L. Malhotra.

List of reference materials/books/

1. An introduction to fire dynamics -D.Drysdale
2. Structural fire protection Edt by T.T.LIE
3. Elevator technology - G.C.Barney
4. Heating Ventilating and Air Conditioning Analysis and Design - Faye C. McQuiston and Jerald D. Parker.
5. Building Maintenance Management-R.Lee
6. Developments In Building Maintenance -I.EJ. Gibson

Concrete Structures: materials, Maintenance and Repair D.Campbell,Allen & H.Roper

Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/105/102/105102176/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Assignment students: A case study of fire hazard in building and restoration procedure adopted

SUSTAINABLE DESIGN CONCEPT FOR BUILDING SERVICES			
Course Code	**24CV36C**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100

Contact Hours	40	Exam Hours	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- **B**asics of Building Services
- Environmental Science & Climate Change Basics
- Green Building Standards and Certifications
- Sustainable Materials and Technologies

Course objectives:

- To facilitate learners to understand sustainable building designs and its parameters such as energy and water efficiency, Comfort in buildings, and waste management.
- To expose the learners to shading systems, thermal and visual comfort.
- To impart fundamental knowledge on Life cycle assessment and Green ratings and certifications.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8 Hours**

Introduction to Sustainability and Climatology: Overview of Sustainability – Global energy scenario, carbon footprint and climate action, Net zero in carbon offsetting, Water neutral, Sustainable construction and resource management. Green buildings - Selection of site – preservation and planning, Influence of climate on buildings, Basics of climatology, Earth –
Sun relationship, Solar angles and sun path diagram, Design of shading systems.

Text Book:1 Chapter-1:1.1 Chapter-5: 5 **L1, L2**

Module-2 **8 Hours**

Comfort in Buildings: Thermal comfort – Basics of Thermodynamics, Convection/radiation heat transfer, Heat gain through various elements of a building, Thermal comfort models and case studies Acoustics – Building acoustics, measures, defects and prevention of sound transmission Indoor Air Quality – Effects, design consideration and integrated approach for IAQ management Visual comfort – Enhancement strategies for Daylighting and Artificial

Text Book:1 Chapter-2: 2.1 Chapter-9: 9 **L1, L2**

Module-3 **8 Hours**

Energy, water efficiency and waste management in buildings: Energy efficiency – Energy efficiency in building envelope and energy efficient HVAC and Lighting as per Energy conservation building code (ECBC) 2017, Energy simulation, Energy management system – Renewable energy and Energy Audit. Water Efficiency – Planning and design of water management system, Rain water harvesting, Water efficient design and fixtures, Treatment and reuse and Water efficient landscape system.

Waste management – Types of waste and its treatment methods, Construction and demolition waste management, Waste management in residential, commercial buildings, healthcare facilities.

Text Book:1 Chapter-10:10 Chapter-12: 12.1 & 12.3 **L1, L2, L3**

Module-4	**8 Hours**

Life Cycle Assessment of Buildings and Green project management: Materials – Green product certifications, features of sustainable building materials and sustainable alternatives for structural, envelope and finishing materials. Low carbon cement, Zero emission bricks and lean construction practices. Life cycle assessment and its types – Modelling and Analysis, Greenhouse gas emission. Different phases of green building project management.

Text Book:1 Chapter-2:2.2; 2.3 **L1, L2, L3**

Module-5	**8 Hours**

Sustainable rating systems: Green building rating systems- LEED, BREEAM and others, Indian Green building rating systems – IGBC & GRIHA. IGBC criteria for certification -site selection credits, pre-design credits, detailed design credits, pre-construction credits, construction credits, post construction credits.

Greenhouse gas emission. Different phases of green building project management.

Text Book:1 Chapter-3:3.1 to 3.7 **L1, L2,L3**

Course outcomes (Course Skill Set):

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

CO1: Comprehend sustainable design, climatology, shading system and analyze heat transfer mechanism in buildings. (PO – 3,7 PSO – 1,2)

CO2: Assess the design considerations and parameters for thermal comfort, visual comfort, indoor air quality and acoustics. (PO – 3,7 PSO – 1,2)

CO3: Develop solutions for energy efficiency, water efficiency and waste management in buildings. (PO – 3,7 PSO – 1,2)

CO4: Adopt green project management methodology and evaluate building life cycle assessment. (PO – 3,7 PSO – 1,2)

CO5: Implement green practices during construction and operation phase of the buildings for achieving green rating. (PO – 3,7 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Textbook:

1. Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Reference Books:

1. HarharaIyer G, Green Building Fundamentals, Notion Press
2. IGBC Green new building rating system - version 3.0 - Abridged reference guide
3. The Sustainable Habitat Handbook (6 Volume Set), GRIHA Version 2019
4. National Building Code – 2016, Volume 1&2, Bureau of Indian Standards
5. Energy Conservation Building Code – 2017 (with amendments up to 2020), Bureau of Energy Efficiency

Web links and Video Lectures (e-Resources):
• E-learning content on L&T EduTech Platform.
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • ECO – NIWAS by Ministry of Power, Free Web tool to practice energy conservation • Roof top solar energy calculator, Free Web tool to calculate solar power available.

DATA ANALYTICS WITH EXCEL			
Course Code	**24CV37A**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:0:2	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	30	**Exam Hours**	3
Examination type (SEE)	Practical		

Prerequisites:

The students should have knowledge on

- Basic Computer Skills
- Basic Mathematical and Statistical Concepts
- Fundamentals of Microsoft Excel
- Analytical Thinking

Course objectives:

- Understand the use of Spreadsheet for data collection and analysis.
- Evaluate the equations using Excel functions
- Learn the data quality and consistency of data

Sl.NO	Experiments
1	Introduction to Data Analysis Using Spreadsheets: Fundamentals of spreadsheet applications, Excel interface, and learn how to navigate around a worksheet and workbook.
2	Using Excel Spreadsheets: Perform basic spreadsheet tasks, such as viewing, entering and editing data, and moving, copying and filling data. Learn about the fundamentals of formulas, and learn about the most common functions used by a data analyst. Finally, you will learn how to reference data in formulas.
3	Cleaning & Wrangling Data Using Spreadsheets: Importance of data quality, how to import file data in to Excel, fundamentals of data privacy, remove duplicate and inaccurate data, and how to remove empty rows in your data..
4	How to deal with inconsistencies in your data and how to use the Flash Fill and Text to Columns features to help you manipulate and standardize your data
5	Analyzing Data Using Spreadsheets: Fundamentals of analyzing data using a spreadsheet, and learn how to filter and sort data. Learn how to use some of the most useful functions for a data analyst
6	How to use the VLOOKUP and HLOOKUP reference functions. In addition, learn how to create pivot tables in Excel, and use several pivot table features
7	Final Project: In this final module, you will be introduced to a hands-on lab where you will complete a graded assignment for cleaning and preparing data, and then analyzing data using an Excel spreadsheet.

8	Submission of report for final assessment

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

CO1: Prepare the data sets and perform the analysis. (PO – 1,2,5 PSO – 1,2)
CO2: Analyze and perform repetitive calculations using several functions (PO – 1,2,5 PSO – 1,2)
CO3: Design and apply solutions to verify the data sets (PO – 1,2,5 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

- https://www.coursera.org/learn/excel-basics-data-analysis-ibm
- Any online platform with the above course content like YouTube videos and NPTEL courses

SMART URBAN INFRASTRUCTURE			
Course Code	**24CV37B**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	1:0:0	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	15	**Exam Hours**	1
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic Knowledge of Urban Planning
- Fundamentals of Civil and Transportation Engineering
- Environmental and Sustainability Concepts

Course objectives:

- Knowing about Urban Infrastructure Systems & their Management
- Knowing about Smart Cities Key Concepts
- Understand the Transport and Energy Smart Urban Infrastructure and Services
- Developing Feasibility Studies for Smart City Services
- Understand the Global Context of Smart Cities

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **3Hours**

Introduction to Smart Urban Infrastructures and Smart Cities: Introduction to smart city, Basic concept of developing smart city, Global standards to create smart city. Different conceptual approaches to Smart Cities and discussing the pros and cons of each approach.

Smart urban Infrastructure: List of infrastructure facilities, advantages and disadvantages.

L1, L2

Module-2 **3Hours**

Smart Urban Energy Systems: Introduction to Smart Energy Systems, Government policy and technology. Energy sector to explore some of the most important managerial considerations in the transition phase and operation of Smart Urban Energy Systems.

L1, L2

Module-3	3Hours
Smart Transportation Technologies: Introduction to smart transportation system, Mode of transport systems for smart city, data collection to arrive at best transport facility. Significant opportunities and threads for legacy urban transportation systems. Managerial considerations to facilitate the transition phase, and operation of Smart Urban Transportation Systems **L1, L2**	
Module-4	**3 Hours**
Towards Smart Cities: Important factors in the transition phase of legacy cities to Smart cities and their managerial implications.	
Module-5	**3 Hours**
Towards Smart Cities: Management of Smart Cities calls for different approaches from conventional urban management approaches. The role of city government in the network of actors who play an important role in management of Smart Cities.	

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Understand the concept of smart city (PO – 1,2,6 PSO – 1,2)
CO2: Play the role of a civil engineer in providing smart infrastructure (PO – 1,2 ,6 PSO – 1,2)
CO3: Efficient energy system for smart city (PO – 1,2,6 PSO – 1,2)
CO4: Analyse and design efficient transport system (PO – 1,2,3,6 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

1. The question paper will have ten questions. Each question is set for 10 marks.
2. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Book

1. Infrastructure for Smart Cities, Dr. R P Rathaliya, Shree Hari Publications, 2021

Reference Books

1. Building Smart Cities, ISBN-13 978-1032340128, by Carol L. Stimmel, 2022
2. Smart Cities for Sustainable Development, Ram Kumar Mishra, Ch Lakshmi Kumari, Sandeep Chachra, P.S. Janaki Krishna, Springer, ISBN-13 978-9811674099, 2022

Web links and Video Lectures (e-Resources):

- https://www.coursera.org/learn/smart-cities

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

PROBLEM SOLVING WITH PYTHON			
Course Code	**24CV37C**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:2:0	**SEE Marks**	50
Credits	15	**Total Marks**	100
Contact Hours	01	**Exam Hours**	1
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic Programming Skills
- Basic Mathematics
- Problem-Solving Skills

Course objectives:

- To understand why Python is a useful scripting language for developers.
- To read and write simple Python programs
- To learn how to identify Python object types.
- To learn how to write functions and pass arguments in Python.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **3Hours**

Introduction to Python: Installing Python and Python packages, Managing virtual environments with venv module Introduction to NumPy arrays: Array creation, indexing, data types, broadcasting, copies and views, universal functions, I/O with NumPy

Module-2 **3Hours**

Introduction to NumPy and SciPy:NumPy subpackages– linalg, fft, random, polynomials, SciPy subpackages– linalg, fftpack, integrate, interpolate, optimize Introduction to Matplotlib: Plotting 2D graphs with Matplotlib, annotations, legend, saving plots to file, bar and pie charts, line plots.

Module-3 **3Hours**

Linear algebra using NumPy and SciPy:Solving linear simultaneous equations using NumPy and SciPy using numpy.linalg and scipy.linalg – solve, inverse, determinant, least square solution, Linear algebra using NumPy and SciPy (continued): Decomposition using lu and cholesky. Solving eigenvalue problems using NumPy and SciPy:Using numpy.linalg and scipy.linalg – eig, eigvals.

Module-4	3Hours
Solving initial value problems for ODE systems using scipy.integrate subpackage – solve_ivp, RK45, LSODA. Numerical integration of functions using SciPy:Using scipy.integrate subpackage– Definite integral using Gaussian quadrature – quad and quadrature Numerical integration of fixed samples using scipy. integrate subpackage– Trapezoidal rule trapezoid, Simpson's 1/3 rule using Simpson, Romberg integration romb.	
Module-5	**3Hours**
Determining roots of equations using SciPyusing scipy. optimize sub package– Bisection method bisect, Brent's method brentq, Newton-Raphson method newton. Symbolic computing using SymPy and solving civil engineering problems using SymPy: Introduction, defining symbols, derivatives, integrals, limits, expression evaluation, expression simplification, solving equations, solving differential equations.	

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Understand Python syntax and semantics and be fluent in the use of Python flow control and functions. (PO – 1,2,3, PSO – 1,2)

CO2: Demonstrate proficiency in handling Strings and File Systems. (PO – 1,2, PSO – 1,2)

CO3: Represent compound data using Python lists, tuples, Strings, dictionaries. (PO – 1,2, PSO – 1,3)

CO4: Read and write data from/to files in Python Programs (PO – 1,2, PSO – 1,3)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

1. The question paper will have ten questions. Each question is set for 10 marks.
2. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

1. R. Nageswara Rao, "Core Python Programming", dreamtech

Reference Books

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming, Reema theraja, OXFORD publication

Web links and Video Lectures (e-Resources):
• NumPy documentation at https://numpy.org/doc/ • SciPy documentation at https://docs.scipy.org/doc/scipy/ • Matplotlib documentation at https://matplotlib.org/stable/users/index • SymPy documentation at https://docs.sympy.org/latest/index.html.
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Real world problem solving: Demonstration of projects developed using python language

BUILDING MATERIALS AND CONSTRUCTION			
Course Code	**24CV41**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic knowledge in fundamental engineering principles.
- Basic understanding the properties of different materials.

Course Objectives:

- To recognize good construction materials based on properties.
- To investigate soil properties and design suitable foundation.
- To understand the types and properties of masonry materials and supervise masonry construction.
- To gain knowledge of structural components like lintels, arches, staircase and roofs.
- To understand the finishes in construction like flooring, plastering, paining.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8 Hours**

Building Materials: Stone as building material; Requirement of good building stones, Dressing of stones, Deterioration and Preservation of stone work. Bricks; Classification, Manufacturing of clay bricks, Requirement of good bricks. Field and laboratory tests on bricks; compressive strength, water absorption, efflorescence, dimension and warpage. Cement Concrete blocks, Autoclaved Aerated Concrete Blocks, Sizes, requirement of good blocks. Timber as construction material.
Fine aggregate: Natural and manufactured: Sieve analysis, zoning, specify gravity, bulking, moisture content. Deleterious materials.
Coarse aggregate: Natural and manufactured: Importance of size, shape and texture. Grading of aggregates, Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. **L1, L2**

Text Book: 1: Chapter-1, 2, 3, 5, 7, 8

Module-2	8 Hours

Foundation: Preliminary investigation of soil, safe bearing capacity of soil, Function and requirements of good foundation, types of foundation, introduction to spread, combined, strap, mat and pile foundation

Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Jointin stone masonry. Types of walls; load bearing, partition walls, cavity walls.
L1, L2
Text Book:2 Chapter-2: 2.1, 2.2,2.7, 3.7,3.8, 3.9, 5, 6.

Module-3	8 Hours

Lintels and Arches: Definition, function and classification of lintels, Balconies, chejja and canopy. Arches; Elements and Stability of an Arch.

Floors and roofs: Floors; Requirement of good floor, Components of ground floor, Selection of flooring material Procedure for laying of Concrete (VDF), Mosaic, Kota, Slate, Marble, Granite, Tile flooring, Cladding of tiles. Roof: Requirement of good roof, Types of roofs, Elements of a pitched roof, Trussed roof, King post Truss, Queen Post Truss, Steel Truss, Different roofing materials, R.C.C. Roof.
L1, L2
Text Book: 2 Chapter-13.1 to 13.15, Chapter 11, 12.

Module-4	8 Hours

Doors, Windows and Ventilators: Location of doors and windows, technical terms, Materials for doors and windows: PVC, CPVC and Aluminium. Types of Doors and Windows: Panelled, Flush, Collapsible, rolling shutter, Panelled and glazed Window, Bay Window, French window. Steel windows, Ventilators. Sizes as per IS recommendations.

Stairs: Definitions, technical terms and types of stairs: Wood, RCC, Metal. Requirements of good stairs. Geometrical design of RCC doglegged and open-well stairs. Formwork: Introduction to form work, scaffolding, shoring, under pinning. **L1, L2**

Text Book: 2 Chapter-17, 14, 26

Module-5	8 Hours

Plastering and Pointing: Mortar and its types. Purpose, materials and methods of plastering and pointing: Sand faced plastering, Stucco plastering, lathe plastering, defects in plastering. Water proofing with various thicknesses.

Damp proofing: Causes, effects and methods. **Paints:** Purpose, types, technical terms, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces. **L1, L2**

Text Book :2 Chapter-19, 20, 21

Course outcomes (Course Skill Set):

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

CO1: Select suitable materials for buildings and adopt suitable construction techniques. (PO– 1,2,7, PSO – 1,2)

CO2: Decide suitable type of foundation based on soil parameters. (PO – 1,2, PSO – 1,2)

CO3: Supervise the construction of different building elements based on suitability. (PO–1,2,6,7, PSO – 1,2)

CO4: Exhibit the knowledge of building finishes and form work requirements. (PO – 1,26,7, PSO – 1,2)

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks.
- Any two assignment methods mentioned in the regulations; if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by the University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Textbook:

1. Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India.
2. Dr. B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.

Reference Books:

1. S. K. Duggal, "Building Materials", (Fourth Edition) New Age International (P) Limited, 2016 National Building Code (NBC) of India
2. P C Varghese, "Building Materials", PHI Learning Pvt.Ltd
3. Building Materials and Components, CBRI, 1990, India
4. Jagadish. K.S, "Alternative Building Materials Technology", New Age International,2007.
5. M. S. Shetty, "Concrete Technology", S. Chand & Co. New Delhi.

Web links and Video Lectures(e-Resources):

https://archive.nptel.ac.in/courses/105/102/105102088/

https://www.youtube.com/watch?v=ULt4aEst4mM

http://www.digimat.in/nptel/courses/video/105102088/L09.html
http://www.digimat.in/nptel/courses/video/105102088/L20.html

https://www.classcentral.com/course/youtube-civil-building-materials-and-construction-47666

Activity Based Learning (Suggested Activities in Class)/Practical Based Learning

- Assessment Methods for 25 Marks (opt two Learning Activities)
    - Case Study
    - Assignment
    - Gate Based Aptitude Test
    - MOOC Assignment for selected Module
    -

ANALYSIS OF STRUCTURES			
Course Code	**24CV42**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	03
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Structural forms and stability
- Basic Structural analysis
- Strength of Materials (SOM)
- Problem Solving Approach
- Basic Drawing and Interpretation

Course Learning objectives: This course will enable students to

- Understand the Different Forms of Structural Systems.
- Determine the Strain Energy and Slope and Deflection of Beams, Trusses and Frames.
- Analyse arches and cable structures.
- Analyse different types of beams and frames using slope deflection method.
- Analyse different types of beams and frames using moment distribution method.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8 Hours**

Introduction and Analysis of Plane Trusses: Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and nonlinear analysis, Static and kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

L1, L2, L3

Text Book:1 Chapter 1: 1.1 to 1.7 Chapter 3 : 3.1. to 3.6

Module-2	8Hours
DEFLECTION OF BEAMS: Moment area method: Derivation, Mohr's theorems, sign convention; Application of moment area method to determinate prismatic beams, beams of varying cross section; Use of moment diagram by parts. **Strain Energy:** Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion (No numerical). Castigliano's theorems, application of Castigliano's theorems to calculate deflection of beams, trusses and frames (No numerical on unit load method). **L1, L2, L3** **Text Book:1** Chapter 5: 5.1 to 5.4 Chapter 6: 6.1 to 6.9	
Module-3	**8Hours**
Arches and Cable Structures: Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels- Stiffening trusses for suspension cables. **L1, L2, L3** **Text Book**:1 Chapter 8.1 to 8.6	
Module-4	**8 Hours**
Slope Deflection Method: Introduction, sign convention, development of slope deflection equation; Analysis of continuous beams including settlement of supports; Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy up to 3 **L1, L2, L3, L4** **Text Book:1** Chapter 11: 11.1 to 11.6	
Module-5	**8 Hours**
Moment Distribution Method: Introduction, Definition of terms, Development of method, Analysis of continuous beams with support yielding, Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy up to 3 **L1, L2, L3, L4** **Text Book: 1** Chapter 12: 12.1 to 12.7	

Course outcome (Course Skill Set):

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

- **CO1**: Identify the different forms of structural systems and analyse the trusses. (PO – 1,2 3, PSO -1,2)
- **CO2**: Evaluate the slope and deflections in beams, frames and trusses by using moment area method and energy principle. (PO – 1,2,3 PSO -1,2)
- **CO3**: Analyse and determine the stress resultants inarches and cables. (PO – 1,2,3 PSO -1,2)
- **CO4**: Analyse the indeterminate structures and construct BMD AND SFD using slope deflection methods. (PO – 1,2,3 PSO -1,2)
- **CO5**: Analyse the indeterminate structures and construct BMD AND SFD using Moment Distribution Method. (PO – 1,2,3 PSO -1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Textbook:

1. Reddy, C.S., Basic Structural Analysis, 3 rd. ed., Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2011.

Reference Books:

1. Hibbeler, R.C., Structural Analysis, 9 th edition., Pearson publications., New Delhi, 2012.
2. Thandavamoorthy, T.S., Structural Analysis, 6 th edition., Oxford University press., New

Delhi,2015.
3. L S Negi and R S Jangid, “Structural Analysis”, Tata McGraw-Hill Publishing Company Ltd.
4. D S Prakash Rao, “Structural Analysis: A Unified Approach”, Universities Press 4
5. K.U. Muthu and H. Narendra, “Indeterminate Structural Analysis”, IK International Publishing Pvt. Ltd.
6. Gupta S P, G S Pundit and R Gupta, “Theory of Structures”, Vol II, Tata McGraw Hill Publications company Ltd.
7. V N Vazirani and M M Ratwani, “Analysis of Structures”, Vol. 2, Khanna Publishers
8. Wang C K, “Intermediate Structural Analysis”, McGraw Hill, International Students Edition. S. Rajashekhara and G. Sankarasubramanian, “Computational Structural Mechanics”, PHI Learning Pvt. Ltd.,
9. S S Bhavikatti, structural analysis, vikas publishing house pvt.ltd., new Delhi
10. S Ramamrutham and R Narayanan,Theory of structures, Dhanpat Rai Publishing Company.

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/105105166
- https://nptel.ac.in/courses/105105166
- https://nptel.ac.in/courses/105105166
- https://nptel.ac.in/courses/105105109
- https://nptel.ac.in/courses/105105109
- https://nptel.ac.in/courses/105105109

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Seminars /Quiz (to assist in GATE preparations)
- Demonstrations in using Softwares
- Self-Study on simple topics
- Simple problems solving by Etabs/Staad pro.

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped,1: Low Mapped, 2: Moderately Mapped3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

TRANSPORTATION ENGINEERING			
Course Code	**24CV43**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Understanding of Civil Engineering fundamentals.
- Basics of land measurements and map reading.
- Understanding of highway materials, aggregates, bitumen and concrete used in roads.
- Basic knowledge of types of transportation systems.

Course Learning objectives: This course will enable students to

- Gain knowledge of different modes of transportation systems and to learn the introductory concepts on Highway Engineering.
- Get insight to different highway materials and pavement design elements of a highway network.
- Realize the significance of road safety by incorporating the concepts of Traffic Engineering.
- Understand to different aspects of geometric elements of railway system and evaluate the material quantity required for track laying
- Gain knowledge about various components of an Airport and its runway design.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

MODULE-1 **8Hours**

TRANSPORTATION ENGINEERING: Introduction, Different Modes of Transportation, M R Jayakar Committee recommendations, Road Classifications and Road Patterns.

Highway Alignment: Factors affecting highway alignment, Engineering surveys for alignment-conventional and modern methods.

Highway Geometric Design: Factors affecting geometric design of roads, Cross Sectional Elements, Sight distances, Horizontal alignment- Transition curve, superelevation, Extra widening, Vertical

alignment–gradients, summit and valley curves. ***(No derivations)***

Problems on Sight distance, Super elevation, extra widening of curves, Length of transition curve, Length of summit and valley curve.

L1, L2

Text Book :1 Chapter1:1.1,1.2,1.3, Chapter 2:2.4, Chapter 3:3.1,3.2, Chapter 4:4.2,4.3,4.4,4.5

MODULE-2 **8Hours**

HIGHWAY MATERIALS AND PAVEMENTS: Desirable properties of aggregates, soil subgrade & Bitumen, Application of bituminous emulsion, Desirable properties of Bituminous Mixes

Pavement Design: Factors Controlling design of highway pavements, Pavement types, component parts of pavements and their functions; types of joints used in rigid pavement. Critical stresses in flexible and rigid pavement.

Highway Drainage: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, Types of cross drainage structures their choice and location.

Problems on design of Longitudinal drain. **L2, L3**

Text book :1 Chapter 6:6.1,6.2,6.3,6.4,6.5,6.6, Chapter11:11.1,11.2,11.3,11.6,

MODULE-3 **8Hours**

TRAFFIC ENGINEERING: Objectives and scope of Traffic Engineering. Traffic Characteristics: Road user characteristics, vehicular characteristics – static and dynamic characteristics, Reaction time of driver and PIEV theory, Types of traffic engineering studies-volume, spot speed, speed and delay, parking, accident, origin & destination, objectives of studies and data collection, method of study, analysis. PCU concept, factors affecting and PCU at different locations and applications. Traffic signs, Signal design by IRC method; Types of intersections.

Problems on Spot speed studies, Speed and delay studies, accident studies, Signal design by IRC method. **L2, L3**

Text Book: 1, Chapter 5:5.1,5.2,5.3,5.4,5.5,5.6,5.9,5.10

MODULE-4 **8Hours**

RAILWAY ENGINEERING: Permanent way and its requirements, Gauges and types, Typical cross sections single and double-line BG track, Coning of wheels and tilting of rails, Rails-Functions-requirements, types and defects of rails. Sleepers and Ballast: Functions, requirements, Track fitting and fasteners, Calculation of quantity of materials required for laying a track, Points & crossings, Railway Station and Yards. Metro train & high- speed train- Design factors considered.

Problem on Quantity calculation for laying railway track. Super-elevation **L1, L2**

Text Book :2, Chapter1: 1.1,1.2, Chapter 4,5,6,7,11,13,15,17

MODULE-5	8Hours

AIRPORT ENGINEERING: Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples.

RUNWAY-Basic runway length-Corrections and examples, Runway geometrics, Taxiway-Factors affecting the layout - geometrics of taxiway-Comparison between Runway and Highway, Design of exit taxiway with examples.

Problems on Runway orientation, Basic Runway length, Exit taxiway design. **L1, L2, L3**

Text Book :3 Chapter 1:1.1 to 1.5, Chapter 3: 3.1to 3.5, Chapter 4,5,6,7

Course outcomes (Course Skill Set):

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

CO1: Explain the basic principles of geometric design in the context of transportation engineering and planning. (PO:1,2,3, PSO: 1,2)

CO2: Select the appropriate pavement materials for construction and design the pavement as per standard practices. (PO:1,2,3,8, PSO: 1,2)

CO3: Conduct traffic studies and analyze traffic data for practical applications. (PO 1,2,3,4, PSO:1,2,3)

CO4: Identify the Components parts of Railway Track and design the suitable runway for an Airport. (PO:1,2,3,7 PSO:1,2)

CO5: Able to interpret the experimental results of highway materials based on laboratory tests and design the pavement as per IRC guidelines. (PO:1,2,3,4,5, PSO: 1,3)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)

- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Textbook:

1. SK Khanna,CEG Justo and A Veeraraghavan, Highway Engineering,10th edition, Nem chand and bros., Roorkee, India.
2. S C Rangawala, Railway Engineering, 15th edition, Charotar Publishing house, Anand, India.
3. SC Rangawala, Airport Engineering, 18th edition, Charotar Publishing house, Anand, India

Reference Books:

1. L R Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.
2. "A Text Book of Railway Engineering" by S C Saxena and S P Arora
3. "Airport Engineering" by S C Rangwala
4. "Airport Planning and Design" by Khanna Arora and Jain, Nem Chand Bros, Roorke.
5. Roads, Railways, Bridges, Tunnels and Harbour Dock Engineering by B L Gupta, Amit Gupta

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CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

FLUID MECHANICS AND HYDRAULICS			
Course Code	**24CV44**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	3:0:2	**SEE Marks**	50
Credits	04	**Total Marks**	100
Contact Hours	40 + 15 Lab slots	**Exam Hours**	3
Examination type (SEE)	Theory/Practical		

Prerequisites:

The students should have knowledge on

- Basic Physics Knowledge
- Engineering Mechanics
- Units and Dimensions
- Basic Problem-Solving Skills

Course Learning objectives: This course will enable students to

- Understand the Fundamentals of properties of fluids, fluid pressure measurement and hydrostatic law
- Learn the Principles of kinematics, hydrodynamics and its applications
- Study the Flow measurements and design of pipes
- Understand the design of open channels and energy concepts
- Understand the Working principles of hydraulic turbines and pumps

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

MODULE-1	**8 Hours**
Fluids and their properties – compressibility, surface tension, capillarity, Pascal's law, hydrostatic law, fluid pressure measurement using simple and differential manometers, Total pressure and center of pressure on vertical and inclined plane surfaces.	**L2, L3**
Text Book :1, Chapter1: 1.1 to 1.7 Chapter 2 2.1 to 2.7	

MODULE-2	**8 Hours**
Kinematics- Types of flow, continuity equation in Cartesian coordinates, velocity potential, stream function, flow nets, Dynamics-Euler's equation of motion, Bernoulli's equation, Application- Venturi meter, Orifice meter, Pitot tube.	**L2, L4**
Text Book :1, Chapter 5: 5.1 to 5.8 Chapter 6 6.1 to 6.7	

MODULE-3	8 Hours
Classification of orifice and mouthpiece, hydraulic coefficients, discharge over rectangular, triangular and Cipoletti notch, Flow through pipes- major and minor losses, pipes in series and parallel, equivalent pipe, concept of water hammer and surge tanks. **L2, L4** **Text Book :1,** Chapter 7: 7.1 to 7.6 Chapter 11 ,11.1 to 11.5	
MODULE-4	**8 Hours**
Open channel hydraulics- classification of flow, Most economical channel sections-rectangular, triangular, trapezoidal, circular, Uniform flow, specific energy-rectangular channels, on-uniform flow, hydraulic jump-equation and applications, GVF equation-types. **L2, L4** **Text Book :1,** Chapter16: 16.1 to 16.9	
MODULE-5	**8 Hours**
Momentum equation, impact of jet on stationary and moving curved vanes Turbines-types, Pelton wheel-working proportions, velocity triangles Francis turbine- working proportions, velocity triangles Centrifugal pumps-work done, efficiency, multi-stage pumps. **L2, L4** **Text Book :1,** Chapter17: 17.1 to 17.4 Chapter18 ,18.1 to 18.9 Chapter19: 19.1 to 19.7	

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Sl.NO	Experiments	
1	Verification of Bernoulli's equation	L1, L2
2	Calibration of Venturi meter/Orifice meter	L1, L2
3	Determination of hydraulic coefficients of small vertical orifice	L1, L2
4	Calibration of triangular notch	L1, L2
5	Determination of Cd for Cipoletti notch	L1, L2
6	Determination of major losses in pipes	L1, L2
7	Determination of Cd for ogee/broad crested weir	L1, L2
8	Determination of efficiency of jet on flat and curved vanes	L1, L2
9	Determination of Cd of Venturi flume	L1, L2
10	Demo of determination of efficiency of centrifugal pump	**L1, L2**
11	Demo of determination of efficiency of Francis/Kaplan turbine	**L1, L2**
12	Demo of determination of efficiency of Pelton wheel	**L1, L2**

Course outcomes (Course Skill Set):
At the end of the course, the student will be able to:

- Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics.
- Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure.
- Compute the discharge through pipes, notches and weirs.
- Design the turbines and open channels of different sections and to estimate the energy loss in hydraulic jump.
- Able to interpret the experimental results of discharge, efficiency based on the test conducted in the laboratory.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the

syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Text Books:

1. **1.** R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines- Laxmi Publications, New Delhi

Reference Books:

1. P.N. Modi and S.M. Seth-Hydraulics and Fluid Mechanics, including Hydraulic machines, standard Book House, New Delhi
2. K Subramanya- Fluid Mechanics and Hydraulic Machines, Tata McGraw-Hill, New Delhi
3. Victor L. Streeter, Benjamin Wyile E and Keith W. Bedford- Fluid Mechanics, Tata McGraw Hill publishing Co Ltd, New Delhi
4. J.F. Douglas. M. Gastric, John Warfield, Lynne Jack – Fluid Mechanics, Pearson, Fifth edition.
5. K. Subramanya- Fluid Mechanics and Hydraulic Machines, Problems and Solutions, Tata McGrawhill, New Delhi.
6. S K SOM and G.Bis was – Introduction to Fluid Mechanics and Fluid Machines, Tata Mcg raw Hill, New Delhi.

Web links and Video Lectures (e-Resources):

- YouTube Videos

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning:

- Visit to hydro- electric power plant
- Visit to sites to visualize the flow measuring devices, viz., weirs, spillways, etc.

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped, 2: Moderately Mapped 3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

BUILDING MATERIALS TESTING LABORATORY			
Course Code	**24CVL45**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:0:2	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	30	**Exam Hours**	03
Examination type (SEE)	Practical		

Prerequisites:

The students should have knowledge on

- Understanding of mechanics of materials
- Basic ideas of construction materials
- Basic testing procedures.

Course objectives:

- Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
- Abilitytofunctiononmulti-disciplinaryteamsintheareaofmaterialstesting.
- Ability to use the techniques, skills and modern engineering tools necessary for engineering.
- Understandingofprofessionalandethicalresponsibilityintheareasofmaterialtesting.
- Ability to communicate effectively the mechanical properties of materials.

Sl.NO	Experiments
1	Tests on Bricks, Tiles, Cement Concrete blocks (Weight &Dimensionality, Water Absorption, Strength) **L1, L2, L3, L4**
2	Tests on Fine aggregates - Sieve Analysis, Moisture content, Specific gravity, Bulk density, Bulking and Silt Content **L1, L2, L3, L4**
3	Tests on Coarse aggregates- Sieve Analysis, Water absorption, Moisture content, specific gravity and Bulk density **L1, L2, L3, L4**
4	Compression test on mild steel, cast iron and wood. **L1, L2, L3, L4**
5	Tension test on mild steel and HYSD bars **L2, L3, L4**
6	Torsion test on mild steel circular sections. **L1, L2, L3, L4**
7	Bending Test on Wood Under two-point loading. **L1, L2, L3, L4**
8	Shear Test on Mild steel- single and double shear. **L1, L2, L3, L4**
9	Impact test on Mild Steel (Charpy &Izod). **L1, L2, L3, L4**
10	Hardness tests on ferrous and non-ferrous metals- Brinell's, Rockwell and Vicker's. **L1, L2, L3, L4**
11	Introduction to the Identification of Minerals and Rocks **L1, L2**

12	Demonstration of Strain gauges and Strain indicators.	**L1, L2, L3, L4**

NOTE: All tests to be carried out as per relevant latest BIS Codes

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- **CO1**: Analyze the physical characteristics, and behavior of common building materials.
- **CO2**: Reproduce the basic knowledge of mathematics and engineering in finding the strength intension, compression, shear and torsion for steel
- **CO3**: Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.
- **CO4:** Recognize the importance of ethical conduct, integrity, and accuracy in materials testing and reporting

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are**50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement

evaluation rubrics shall be decided jointly by examiners.

- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

- Davis, Troxell and Hawk, "Testing of Engineering Materials", International Student Edition – McGraw Hill Book Co. New Delhi.
- M L Gambhir and Neha Jamwal, "Building and construction materials-Testing and quality control", McGraw Hill education (India)Pvt. Ltd.,2014.
- Fenner, "Mechanical Testing of Materials", George Newnes Ltd. London.
- Holes K A, "Experimental Strength of Materials", English Universities Press Ltd. London.
- Suryanarayana A K, "Testing of Metallic Materials", Prentice Hall of India Pvt. Ltd. New Delhi.
- Kukreja C B, Kishore K. and Ravi Chawla "Material Testing Laboratory Manual", Standard Publishers & Distributors1996.
- Relevant latest IS Codes.

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes

Course outcomes	Program outcomes												Program Specific Outcomes	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped,2: Moderately Mapped 3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

CONSTRUCTION EQUIPMENT, PLANTS AND MACHINERY

Course Code	**24CV46A**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	2:2:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic Knowledge of Construction Practices
- Building Materials and Construction Technology
- Site Safety and Operations Awareness

Course objectives:

- To provide insight on the different functions and operations of different equipment and techniques during construction
- To impart knowledge on the various maintenance and safety to be considered during construction
- To acquire knowledge on the life cycle of a construction equipment
- To adopt mechanization in the Construction industry

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8 Hours**

Basics and Hydraulics of Construction Equipment: Introduction to Construction Equipment- Functions, Operations of Construction Equipment Introduction to Four & Two Stroke Engine and their components- Introduction and Components to Automobiles. Introduction to Principles of Hydraulic- Calculation of Pressure, Force & Flow- Components of a Hydraulic System- Basic layout of Hydraulic System Applications of Hydraulics- Strand Jack Operation

L1, L2

Module-2 **8 Hours**

Concreting, Earth Moving, Road Making and Quarry/Mining Equipment: Operations of a Batching Plant - Introduction and Components of Concrete Pump & Placer- Concrete Pipeline- Laying and Cleaning- Bulldozer- Classification and Components- Classification, Components and Attachments of Excavator- Backhoe Loader- Classification & components- Introduction and classification to Hot mix Plant Process of Asphalt Paver-PQC Paver- Classification & Components- Motor Grader Classification & Components- Horizontal Movement Vehicles- Quarry/Mining

L1, L2

Module-3	8 Hours
Equipment Life Cycle Management: Life Cycle of an Equipment- Equipment Performance Parameters - Introduction to Maintenance- Types of Maintenance- Maintenance Practices **L1, L2**	
Module-4	**8 Hours**
Tunnelling Equipment / Piling Equipment: Introduction to Tunnel Boring Machines- Details and Operation of a Hard-Rock TBM Details of Earth Pressure Balance (EPB) TBM- Details and operation of Slurry TBM & Components- Hydraulic Grabs- Piling Rig **L1, L2**	
Module-5	**8 Hours**
Mechanization and Digitalization in Construction and Safety in Construction Equipment: Importance of Digital Analytics- Digital Solution in Construction Projects- Importance of Mechanization - Railway Track Construction- Rebar Processing Machine- Operation of Mechanized Equipment-Introduction to 3D Concrete Printer- Importance of Safety- Various PPE & Purpose- Safety of Men & Machines at Work- Safety During Construction Activities Safety with Tools & Tackles. **L1, L2**	

Course outcome (Course Skill Set)

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

CO1: Evaluate equipment and techniques required during construction
CO2: Understand the operation of a batching plant.
CO3: Analyze the equipment life cycle management.
CO4: Comprehend mechanization and digitalization in construction

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Books

1.Velumani. P, "Construction Techniques and Practices", SIA Publishers & Distributers Pvt Ltd, 2020.

Reference Books:

1. Dr. Manoranjan Samal, "Advanced Construction Techniques and Equipment" S.K. Kataria & Sons
2. S.C.Sharma, "Construction Equipment and management" E-Book .2019

Web links and Video Lectures (e-Resources):

E-learning content on L&T EduTech Platform.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Visit to construction site to understand construction equipment

CONCRETING TECHNIQUES AND PRACTICES			
Course Code	**24CV46B**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	2:2:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic Knowledge of Building Materials
- Fundamentals of Concrete Technology
- Construction Practices

Course objectives:

- To present the basics of concrete and different materials used in it.
- To impart knowledge on materials used in concrete, relevant Indian standard codes, and practical aspects on concreting activities at projects.
- To explain the importance of making good quality concrete to build durable structures.
- To introduce the Design of concrete mixes from the Industrial experiences at Sites and optimization of higher grades of Concrete.
- To learn the best practices in concrete construction from industry's decades of experiences, thumb rules, mitigation of concreting issues at Sites

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **8Hours**

Introduction to concrete, overview of materials- cement, low carbon cement, coarse aggregate and fine aggregate, and mineral admixture :- fly ash, GGBS, micro silica / silica fume, metakaolin / rice husk ash, composite cement and ultrafine materials, lab test - fineness of fly ash, recycled aggregate

L1, L2

Module-2 **8Hours**

Water and chemical admixture: source, requirements, limits and testing Blending of aggregate -: Blending of fine and coarse aggregate, gradation for optimization and practical aspects.

L1, L2

Module-3 **8Hours**

Mix design - Volumetric mix design, mix design by absolute volume method, worked out practical examples based on industries experience at project sites over several decades, higher grades of concrete, high performance concrete, test on concrete: workability of concrete, flexural and compressive strength tests.

L1, L2

Module-4	8Hours
Production of concrete-: batching plant, calibration, mixing and transportation of concrete handling of concrete at construction, ready-mix concrete, pumping, placing of concrete with boom placers, levelling, vibration and compaction, cold joints, finishing and curing and protection of concrete **L1, L2**	
Module-5	**8Hours**
Special types of concrete: self-compacting concrete, mass concrete, dry lean concrete, geopolymer concrete, pavement quality concrete, fiber reinforced concrete, composite concrete, lightweight concrete, ferrocement, shotcreteing, guniting, grouting, challenges faced at sites: plastic shrinkage cracks, plastic settlement, honey comb, bug holes, cover to concrete, do's and don'ts in concrete construction, site shoot, introduction on 3D printing. **L1, L2**	

Course outcome (Course Skill Set)

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

CO1: Evaluate the properties of concrete by conducting test on cement, aggregate and concrete (with & without admixtures) for using the data for Mix design procedures (PO-1,2,3 PSO 1,2)

CO2: Understand to Select and proportionate different materials used in a concrete mix including admixtures (PO-1,2,3,6 PSO 1,2)

CO3: Design a concrete mix as per requirement of construction project (PO-1,2,3 ,6 PSO1,2)

CO4: Apply the best practices in concrete construction from industry's requirement, thumb rules, mitigation of concreting issues at Sites. (PO-1,2,3 PSO1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks
5.

Suggested Learning Resources:

Text Books

1. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055.

Reference Books:

1. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.
2. IS 456, IS 269, IS 516, IS 1786, IS 1893, IS 12269, IS 9103, IS 8112

Web links and Video Lectures (e-Resources):

- E-learning content on L&T EduTech Platform.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Visit to construction site to understand concreting process

WATERSHED MANAGEMENT			
Course Code	**24CV46C**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	2:2:0	**SEE Marks**	50
Credits	03	**Total Marks**	100
Contact Hours	40	**Exam Hours**	3
Examination type (SEE)	**Theory**		

Prerequisites:

The students should have knowledge on

- Basic Knowledge of Hydrology
- Fundamentals of Soil Science
- Environmental Science Awareness

Course objectives:

- To understand Watershed Hydrology
- To estimate water demand and learn, water conservation methods
- To understand application of Remote Sensing and GIS in watershed management
- Sustainable measures for watershed management

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

- Chalk and Talk with Black Board
- ICT based Teaching
- Demonstration based Teaching

Module-1 **8 Hours**

Principles of Watershed Management: Basics concepts, hydrology and water availability, surface water, ground water, conjunctive use, human influences in the water resources system. **L1, L2**

Module-2 **8 Hours**

Water resources systems: Integrated water resources system, river basins-morphometric analysis of watersheds for watershed management, watershed management practices in arid and semi-arid regions, watershed management through wells, management of water supply, short term and long-term strategic planning. **L1, L2, L3**

Module-3 **8 Hours**

Conservation of Water: Perspective on recycle and reuse, wastewater reclamation, social aspects of watershed management and community participation, private sector participation, institutional issues, socio-economy, integrated development, water legislation and implementations, case studies

.

Water Harvesting: Rainwater management, conservation, storage and effective utilization of rainwater, structures for rainwater harvesting, roof catchments system, check dams, aquifer storage. **L1, L2, L3**

Module-4

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation. **L1, L2, L3**

Module-5

Applications of RS and GIS in Watershed management: Role of decision support system in watershed management, watershed characteristics of coastal regions, coastal aquifer tor management, uniqueness of coastal water resources.

L1, L2, L3

Course outcome (Course Skill Set)

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

CO1: Discuss surface and ground water resources system and, human influences. (PO-1,2 ,6,7 PSO 1,2)

CO2: Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management. (PO-1,2,6,7 PSO1,2)

CO3: Analyse water resources related issues for conservation and synthesize augmentation of water resources. (PO-1,2 ,6,7 PSO1,2)

CO4: Integrated watershed management system. (PO-1,2,6,7 PSO1,2)

CO5: Apply modern tools in watershed management. (PO-1,2 6,7 PSO1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Book

1. Singh Vir, Raj., "Watershed Planning and Management", Yash Publishing House, Bikaner.3rd Revised Edition, 2016.

Reference Books

2. Murthy, J. V. S., "Watershed Management in India", New Age Publishers, New Delhi. 2nd Edition, 2017.
3. "Decision Support System for Integrated Watershed Management", Colorad State University. 2012.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Seminars/Quiz (To assist in GATE Preparations)
- Self-Study on simple topics
- Discussion of case studies
- Field visits to construction sites

BUILDING INFORMATION MODELLING IN CIVIL ENGINEERING - BASIC			
Course Code	**24CV47A**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:0:2	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	30	**Exam Hours**	3
Examination type (SEE)	Practical		

Prerequisites:

The students should have knowledge on

- Basic Computer Skills
- Basic Understanding of Building Construction
- Knowledge of CAD Software
- Spatial Visualization Skills

Course objectives:

- Understand the concept of Building Information Modelling
- Create the workflow followed in industry during creation of BIM 3D model which includes
- Building the discipline-based model and create the federated models

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Exercise

1. Introduction Building Information Modelling
2. Revit Projects: Project Templates, Revit File Types Working with Revit Elements and Families Exploring the User Interface Starting a Project
3. Setting Up Levels and Grids (Datum Planes) Setting up Levels & Modifying Creating Grids
4. Modelling Walls Creating Walls Modify wall types
5. Working with Doors and Windows Loading Door and Window Types from the Library Creating Additional Door and Window Sizes
6. Using Editing Tools & Working with Views: Using Editing Commands Setting the view display Visibility Graphics, Duplicate Views Elevations & Sections , Adding Callout Views Creating and Modifying 3D Views
7. Modelling Floors Creating and Modifying Floors
8. Modelling Stairs, Railings, and Ramps Creating & Modifying Stairs Working with Railings Sketching Custom Stairs Creating Ramps
9. Modelling Roofs Creating Roofs by Footprint Using Join & unjoin roof

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Prepare, read and interpret the drawings in a professional set up. (PO-1,2,5,6 PSO-1,2)

CO2: Know the procedures of submission of drawings and Develop working and submission drawings for building. (PO-1,2,5,6 PSO-1,2)

CO3: Plan of residential or public building as per the given requirements with details (PO-1,2,5,6 PSO-1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are**50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.

The marks scored shall be scaled down to **20 marks** (40% of the maximum marks). The final CIE marks of the course out of 50 will be the sum of scaled-down marks scored in the report write-up/journal and marks of a test

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedules mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
  Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

- 1. The minimum duration of SEE is 02 hours

Suggested Learning Resources:

Books

1. ISO 19650 - Building Information Modelling (BIM)
   BIM Handbook – Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston

Web links and Video Lectures (e-Resources):

E-learning content on L&T EduTech Platform.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Create a plan of residential building and practice BIM tools

GIS WITH QUANTUM GIS			
Course Code	**24CV47B**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:2:0	**SEE Marks**	50
Credits	01	**Total Marks**	100
Contact Hours	15	**Exam Hours**	1
Examination type (SEE)	Theory (MCQ)		

Prerequisites:

The students should have knowledge on

- Basic Computer Skills
- Fundamentals of Geography and Cartography
- Introduction to Geographic Information Systems (GIS)

Course objectives:

- Learning the open source QGIS software for Civil Engineering applications
- Understand raster and vector data
- Creation of base map and thematic maps for specific application

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **3Hours**

QGIS Introduction: Definition of GIS and its use. Introduction to a free and open source desktop geographic information system software. Types of data (vector and raster formats), web services, useful commands and utilities for geo-processing, extending its capabilities to digital satellite image processing and analysis

L1, L2, L3, L4,

Module-2 **3Hours**

INTRODUCTION IN QGIS About QGIS Characteristics of QGIS Start using QGIS. QGIS TOOLS QGIS Configuration, General tools, Working with projections QGIS Browser. WORKING WITH RASTER DATA Introduction, Display raster data, Raster calculator, Working with images, Practical exercises: Working with raster data and operations

L1, L2, L3, L4, L5

Module-3 **3Hours**

QGIS PLUGINS Additional modules of QGIS or "plugins" Description of Plugins incorporated in QGIS Operations through "plugins" Practical exercises: Different QGIS "plugins" and their applications: GDAL library tool, georeferencing, coordinate capture, format converter.

L1, L2, L3, L4, L5

Module-4	3Hours
CREATE MAPS AND RELATED PRODUCTS: Creation tools, Graphic elements, Atlases generation, and Graphic output creations. Practical exercises: Map creation with QGIS. **L3, L4,**	
Module-5	**3Hours**
RELATIONAL DATABASE MANAGEMENT SYSTEMS AND SPATIAL DATA. Database design, Database connections, Table joins Spatial joins, generate new statistics and new data using table and spatial data information. Practical exercises: Creation of thematic maps like population data of taluk, Watershed map with drainage and water bodies, Highway with other 2 road intersection details **L3, L4, L5**	

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Use opensource software for civil engineering applications (PO-1,2,5, PSO 1 ,2)
CO2: Various tools in QGIS software (PO-1,2,5, PSO 1 ,2)
CO3: Create thematic layers with attribute data (PO-1,2,3.5, PSO 1 ,2)
CO4: Generate maps for decision making (PO-1,2,3,5, PSO 1 ,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Books

1. Geographic Information System-An Introduction, Tor Bernharadsen, 2009, 3rd Edition, Wiley India Pvt. Ltd. New Delhi, ISBN - 9788126511389.
2. Principles of Remote sensing and Image Interpretation, Lillesand and Kiefer, 2011, 6th Edition, John Wiley Publishers, New Delhi, ISBN – 8126532238.

Web links and Video Lectures (e-Resources):

- YouTube videos
- https://docs.qgis.org/3.16/pdf/en/QGIS-3.16-DesktopUserGuide-en.pdf for QGIS manual
- NPTEL Lectures.

Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning

- Prepare the thematic maps using google earth images for various applications

ELECTRONIC WASTE MANAGEMENT - ISSUES AND CHALLENGES			
Course Code	**24CV47C**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	0:2:0	**SEE Marks**	50
Credits	15	**Total Marks**	100
Contact Hours	01	**Exam Hours**	1
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Environmental Science
- Electronic Waste
- Recycling
- Environmental issues

Course objectives:

- To provide students with a comprehensive understanding of e-waste and its impact on the environment.
- To familiarize students with the generation, composition, and hazardous components of e-waste.
- To highlight the health and environmental risks associated with improper e-waste management.
- To introduce students to various methods of e-waste collection, recycling, and disposal.
- To develop an understanding of the relevant policies and regulations governing e-waste management in India.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Blackboard teaching
2. Power point Presentation
3. Videos, NPTEL materials

Module-1	**3 Hours**
Introduction to E-Waste Management, Overview of e-waste and its impact on the environment, Text Book: Chapter 1: 1	**L1, L2**
Module-2	**3 Hours**
E-Waste Generation and Composition, Types of e-waste and their components **Text Book**: Chapter 2:2	**L1, L2**
Module-3	**3 Hours**
E-Waste Hazards and Environmental Impacts, Health and environmental risks associated with e-waste **Text Book**: Chapter 3: 3	**L1, L2**

Module-4	3 Hours
E-Waste Collection and Recycling, Methods of e-waste collection, recycling, and disposal **Text Book**: Chapter 4: 4	**L1, L2**
Module-5	**3 Hours**
E-Waste Management Policies and Regulations, Relevant laws, policies, and regulations in India **Text Book:** Chapter 5: 5, Chapter 6: 6	**L1, L2**

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Explain the concept of e-waste and its significance in the context of environmental sustainability. (PO – 1,2,3,4,5,7,8,12 PSO – 1,2)

CO2: Identify and classify different types of e-waste and describe their components. (PO – 1,2,3,4,5,7,8,12 PSO – 1,2)

CO3: Recognize the potential health and environmental hazards associated with improper e-waste management. (PO – 1,2,3,4,5,7,8,12 PSO – 1,2)

CO4: Evaluate and apply appropriate methods for the collection, recycling, and disposal of e-waste. (PO – 1,2,3,4,5,7,8,12 PSO – 1,2)

CO5: Demonstrate knowledge of the existing policies, regulations, and frameworks for e-waste management in India (PO – 1,2,3,4,5,7,8,12 PSO – 1,2)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Text Books:

1. Varsha Bhagath Ganguly, E Waste management – Challenges and Opportunities in India, Routledge(2021), Taylor and Francis Group, 2021

Reference Books

1. "E-Waste Management: From Waste to Resource" by R. K. Rathore and H. N. Chanakya, TERI Press, 2019
2. "E-Waste in India: An Emerging Crisis" by Sangeeta Sharma, Cambridge Scholars Publishing, 2019
3. "E-Waste Management: Research, Technology, and Applications", Majeti Narasimha Vara Prasad, CRC Press, 2016
4. "Electronic Waste Management and Treatment Technology" by Rezaul Begg, R. M. Sarcar, and R. V. R. Singh, Springer, 2018
5. "E-Waste Management: From Waste to Resource" by Florin-Constantin Mihai, Academic Press, 2018

Web links and Video Lectures (e-Resources):

- NPTEL video Lectures.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Visit to an E-waste management industry

CO & PSO - PO Mapping (Individual Teacher has to fill)

Mapping of Course Outcomes and Program specific outcomes to Program Outcomes														
Course outcomes	**Program outcomes**												**Program Specific Outcomes**	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														
Total														
Average														

Level 0: Not Mapped, 1: Low Mapped, 2: Moderately Mapped 3: Highly Mapped

Note: Depending on the Assessment tool used, higher order POs Can be identified by the concerned course instructor.

UNIVERSAL HUMAN VALUES (UHV)			
Course Code	**24UH48**	**CIE Marks**	50
Teaching Hours/Week (L: T: P)	2:0:0	**SEE Marks**	50
Credits	2	**Total Marks**	100
Contact Hours	30	**Exam Hours**	1
Examination type (SEE)	Theory		

Prerequisites:

The students should have knowledge on

- Basic understanding of Human Values.

Course Objectives:

- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- 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 value-based living in a natural way.
- 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.
- This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Teaching-Learning Process (General Instructions)

Teachers can use following strategies to accelerate the attainment of the various course outcomes.

1. Chalk and Talk with Black Board
2. ICT based Teaching
3. Demonstration based Teaching

Module-1 **5 Hours**

Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

Text Book: Section 1: Chapter-1, 2, 3, 4

Module-2 **5 Hours**

Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, programmed to

ensure self-regulation and Health

Text Book: Section II: Chapter-5,6,7

Module-3	5 Hours

Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

Text Book: Section II: Chapter-8,9

Module-4	5 Hours

Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence**.**

Text Book: Section II: Chapter-10, 11

Module-5	5 Hours

Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

Text Book Section III: Chapter-12, 13, 14, 15

Course outcomes (Course Skill Set):

At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature):

CO1: Apprehend the need of Value Education over Human aspirations (PO-6)

CO2: Assimilate Harmony over the physical needs and to overcome the self- needs for a prosperous life. (PO-6)

CO3: Recognize the need of Harmony in the Family and Society for a better World. (PO-6)

CO4: Explain the need of mutual understanding for Holistic Harmony in all the Levels of Human Existence. (PO-6,8)

CO5: Explain the Holistic understanding of Harmony and Professional Ethics at Individual Level and Society. (PO-6,8)

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks.
- Any two assignment methods mentioned in the regulations; if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by the University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Book

1. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034- 47-1

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, Commonwealth Publishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Romes Report, Universe Books.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh,

Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek 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.

Web links and Video Lectures(e-Resources):

- https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw

2. https://www.youtube.com/watch?v=P4vjfE-2.
YnVk&list=PLWDeKF97v9SP7wSlapZcQRrT7OH0ZlGC4
3. **Course handouts:**
https://drive.google.com/drive/folders/1zioX_4L2fCNX4Agw282PN86pcZZT3
Osr?usp=sharing
4. **Presentation slides:**

https://drive.google.com/drive/folders/1rMUKh1s0HPRBlpp_b1mpS-duNRcwS6YH?usp=sharing