GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology					Branch/Spec.	Civil		
Semester	III					Version	1.0.0.0		
Effective from Academic Year		2026-27				Effective for the batch Admitted in			July 2025
Subject code	2CI3109		Subject Name			Green Buildings and Sustainable Design			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	02	00	01	00	03	Theory	40	60	100
Hours	02	00	02	00	04	Practical	30	20	50

Prerequisites:

Basic knowledge of building construction, heat transfer principles, environmental concepts, and elementary computer skills is required.

Objectives of the Course:

The objective of the course is:

- 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.

Theory syllabus

Unit	Content	Hrs.
1.	**Climatology and Heat Gain in Buildings:** Concept of green buildings and sustainability; climate classification; climatic parameters affecting buildings; solar geometry and sun-path diagrams; heat gain through building elements—walls, roofs, fenestration; heat transfer mechanisms—conduction, convection, radiation.	6
2.	**Comfort in Buildings:** Thermal comfort: human comfort parameters, PMV–PPD indices, adaptive comfort model, ECBC comfort criteria. Visual comfort: daylighting principles, glare control, artificial lighting. Acoustic comfort: sound propagation, noise sources, noise control measures. Indoor air quality: ventilation requirements, pollutants, standards.	8
3.	**Energy Management Systems and Web Tools:** Energy consumption patterns in buildings; building energy management system (EMS); energy performance indicators and benchmarking; introduction to energy auditing concepts; web-based tools—ECONIWAS for energy savings and CO_2 mitigation, Solar Rooftop Calculator for solar potential assessment; interpretation of results.	6
4.	**Resource Efficiency in Buildings:** Energy efficiency measures in building systems; water efficiency techniques including rainwater harvesting and reuse; solid waste management in buildings; sustainable building materials and construction practices.	5
5.	**Green Project Management, LCA and Rating Systems:** Stages in green project management; building life cycle stages; life cycle assessment (LCA) methodology; embodied energy and carbon footprint; green building rating systems—LEED, GRIHA, IGBC; green practices during construction and operation phases.	5

Term Work:

Term Work shall be based on the above syllabus.

Text Books:

1	*Kibert, C. J.,* Sustainable Construction: Green Building Design and Delivery*, Wiley.*
2	*Szokolay, S. V.,* Introduction to Architectural Science, *Routledge.*

3	*Bureau of Energy Efficiency*, Energy Conservation Building Code (ECBC).
Reference Books:	
1	Lechner, N., *Heating, Cooling, Lighting*, Wiley.
2	ASHRAE Handbook – Fundamentals.
3	GRIHA, IGBC, and LEED Technical Manuals.
ICT/MOOCs Reference:	
1	Energy Efficiency, Acoustics and Daylighting in Building, IIT Delhi https://nptel.ac.in/courses/105102175
2	Sustainable Engineering Concepts And Life Cycle Analysis, IIT Kharagpur https://nptel.ac.in/courses/105105157
3	Sustainable Materials and Green Buildings, IIT Delhi http://nptel.ac.in/courses/105102195
4	Strategies for Sustainable Design, IIT Hyderabad https://nptel.ac.in/courses/124106157
Course Outcomes:	
COs	**Description**
CO1	Explain climatology and heat gain through building elements.
CO2	Evaluate thermal, visual, and acoustic comfort in buildings.
CO3	Apply energy management concepts and web-based tools for energy analysis.
CO4	Assess building life cycle impacts and stages of green project management.
CO5	Identify and apply green building rating systems and sustainable practices.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	3	1	2	1	1	1
CO2	2	3	1	2	1	1	3	1	1	3	2	1
CO3	2	2	2	1	3	1	3	2	1	1	1	1
CO4	2	2	3	2	1	2	3	1	1	1	3	2
CO5	1	2	2	1	1	2	3	1	2	2	3	2