



**Gyanmanjari**  
Innovative University

Course Syllabus  
Gyanmanjari Institute of Technology  
Semester-2

**Subject :** Green Building and Energy Management - METCP12513

**Type of course:** Minor Stream

**Prerequisite:** NIL

**Rationale:** Green Building and Energy Management lies in promoting sustainability, reducing environmental impact, and enhancing economic efficiency. Green building practices focus on designing and constructing buildings that minimize resource consumption, reduce waste, and enhance indoor environmental quality. This includes the use of sustainable materials, efficient water management, and improved air quality, contributing to healthier living and working environments. Energy management is integral to green building, involving the use of renewable energy sources, energy-efficient systems, and smart technologies to minimize energy consumption. This reduces greenhouse gas emissions, lowers utility costs, and decreases reliance on non-renewable energy sources.

These practices contribute to the fight against climate change by reducing the carbon footprint of buildings. They also offer economic benefits through lower operating costs, increased property values, and eligibility for green certifications and incentives. Overall, green building and energy management support a sustainable, healthy, and economically viable built environment.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*



**Course Content:**

Sr. No	Course content	Hrs	% Weightage
1	<p><b>Introduction</b> Green Composites for buildings - Concepts of Green Composites - Water Utilisation in Buildings, Low Energy Approaches to Water Management - Management of Solid Wastes, Sullage Water and Sewage - Urban Environment and Green Buildings - Green Cover and Built Environment.</p> <p><b>Green Building Systems</b> Comfort in Building, Thermal Comfort in Buildings- Issues, Heat Transfer Characteristic of Building Materials and construction techniques, Incidence of Solar Heat on Buildings- Implications of Geographical Location- Green management in India - relevance in twenty first century.</p>	16	25%
2	<p><b>Green Building Auditing</b> Environmental reporting and ISO 14001, Climate change business and ISO 14064, Energy and resource conservation- Principles, Design of green buildings-rating systems-LEED Standards – Indian green building council rating system for various types of projects.</p> <p><b>Energy</b> Fundamentals of Energy - Energy production systems - Heating, Ventilating and Air conditioning – Solar Energy - Energy Economic Analysis - Energy Conservation and Audits - Domestic Energy Consumption - Savings - Primary Energy use in Buildings – Residential - Commercial - Institutional and Public Buildings.</p>	19	30%
3	<p><b>Energy Efficiency</b> Energy in Building Design-Energy Efficient and Environmental Friendly Building- Climate, Sun and solar radiation- Psychometrics-Passive Heating and Cooling Systems- Energy Audit-Types - analysis of results-Energy flow diagram-Energy consumption/Unit production- Identification of wastage-Priority of conservative measures-Maintenance of Energy Management Programme</p> <p><b>Energy Management</b> Energy Management of Electrical Equipment-Improvement of Power Factor-Management of Maximum Demand- Energy Savings in Pumps – Fans – Compressed Air Systems-Lighting Systems-Air Conditioning Systems –Operation and Maintenance- Modifications- Energy Recovery Dehumidifier-Water Heat Recovery-Steam Plants.</p>	16	25%
4	<p><b>Alternate Energy Resources</b> Industrial and Buildings Wastes - Biomass Resources for</p>	9	20%



	buildings - Utility of Solar energy in buildings concepts - Low Energy Cooling - Case studies of Solar Passive Cooled and Heated Buildings – Building materials: sources, methods of production and environmental Implications. Embodied Energy in Building Materials. Cost Effective building technologies.		
	<b>Total</b>	<b>60</b>	<b>100</b>

**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>Making report:</b> Assign each students a different green building certification system (LEED, BREEAM, etc.). Have them research and present key criteria, rating systems, and case studies associated with their assigned certification and upload on GMIU Wen Portal	10
2	<b>Material scavenger hunt:</b> Students search online or around campus to find examples of these materials or practices and present their findings to the class. And this search upload on GMIU Web Portal.	10
3	<b>Alternative Energy Source:</b> Faculty assign the task to find out the various alternative sources of energy. Student will prepare detail report on them with their application and upload on GMIU Web Portal.	10
<b>Total</b>		<b>30</b>

**Suggested Specification table with Marks (Theory):60**

Distribution of Theory Marks (Revised Bloom’s Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	NA	NA	NA	NA	NA	NA

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course, the students should be able to:	
CO1	Understand the concepts and factors influencing green building concepts, systems and energy management.



CO2	Impact of indoor environmental quality on occupant well-being and comfort relevant to 21 <sup>st</sup> century in India
CO3	Identify and compare existing energy codes, green building codes and green rating systems.
CO4	Study about the fundamentals of energy and energy production systems pertaining to Residential, Commercial, Institutional and Public Buildings.
CO5	Able to conduct energy audit and apply conservation and maintenance measures
CO6	Demonstrate the energy management of electrical equipment and appliances in buildings

### List of Assignment

Assignment and tutorial base on above mention topic.

### Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

### Text Books:

- [1] Osman Attmann, (2010), "Green Architecture Advanced Technologies and Materials".  
McGraw Hill.

### Reference Books:

- [1] Md. Zakiur Rahman, Most. Sharmin Islam, Md. Shahedur Rashid, (2012) "Practice of Green Building Technologies and Water Conservation Process" LAP Lambert Academic Publishing.  
[2] Sam Kubba, (2012), "Handbook of Green Building Design and Construction: LEED, BREEAM, and Green Globes" Elsevier Science.

