4/4 B.Tech. SEVENTH SEMESTER

CE7T5E	**GREEN BUILDINGS**	**Credits: 3**
Lecture: 3 periods/week		**Internal assessment: 30 marks**
Tutorial: 1 period /week		**Semester end examination: 70 marks**

Pre-requisites: Building planning and drawing, environmental studies

Learning objectives:

- This course aims to highlight importance of Energy- Efficient Buildings within the
- context of Energy issues in the 21st century.
- To familiarize students with the concept of Energy efficiency, Renewable sources of
- energy and their effective adaptation in green buildings
- To give a fuller understanding of Building Form and Fabric, Infiltration, ventilation,
- Lighting, cooling and water conservation.
- To highlight the importance of Environmental Management as well as Environmental
- Impact Assessment methods in Energy efficient buildings.

Course outcomes:

Upon completion of this course, the student will be able to:

1. Understand why buildings should be made energy efficient.
2. Have a fuller grasp on Renewable Energy mechanisms such as Passive Solar heating and collection, Photovoltaics, and Ground source heat pumps, and their adaption to green building concepts.
3. Understand the concepts of Site and Climate, Building Form, Building Fabric,
4. Infiltration and ventilation, Lighting, Heating, Cooling, Energy Management and water conservation.
5. Have the necessary skills to undertake an Environmental Impact Assessment study for
6. Energy Efficient Buildings. They shall be equipped with the associated cutting-edge management strategies too.

UNIT I

Green Buildings within the Indian Context, Types of Energy, Energy Efficiency and Pollution, Better Buildings, Reducing energy consumption, Low energy design.

UNIT II

Renewable Energy sources that can be used in Green Buildings – Solar energy, Passive Solar Heating, Passive Solar collection, Wind and other renewables. A passive solar strategy, Photovoltaics, Climate and Energy, Macro and Microclimate. Indian Examples.

UNIT III

Building Form – Surface area and Fabric Heat Loss, utilizing natural energy, Internal Planning, rouping of buildings. Building Fabrics- Windows and doors, Floors, Walls, Masonry, Ecological walling systems, Thermal Properties of construction material.

UNIT IV

Infiltration and ventilation, Natural ventilation in commercial buildings, passive cooling, odelling air flow and ventilation, Concepts of daylight factors and day lighting, daylight assessment, artificial lighting, New light sources. Cooling buildings, passive cooling, mechanical cooling. Water conservation- taps, toilets and urinals, novel systems, collection and utilization of rain water.

UNIT V

Energy awareness, monitoring energy consumption, Building Environmental Assessment - environmental criteria - assessment methods - assessment tools (e.g. LEED). Ecohomes, Sustainable architecture and urban design – principles of environmental architecture, Benefits of green buildings – Energy Conservation Building code - NBC -Case Studies – Green Buildings in Auroville and Dakshina Chitra, Tamil Nadu, India

Learning resources:

Text Books:

1. William T. Meyer., Energy Economics and Building Design., New York: McGraw- Hill, Inc Indian Green Building Council

Reference Books:

1. Public Technology, Inc. (1996). Sustainable Building Technical Manual: Green Building Design, Construction, and Operations. Public Technology, Inc., Washington, DC.
2. Sim Van Der Ryn, Stuart Cowan, "Ecological Design", Island Press (1996).
3. Dianna Lopez Barnett, William D. Browning,"A Primer on Sustainable Building", Rocky Mountain Green Development Services.
4. The HOK Guidebook to Sustainable Design, Sara Mendler and William Odell, John Wiley.
5. David A. Gottfried, Sustainable Building Technical Manual., Public Technology Inc
6. Richard D. Rush, . Building System Integration Handbook., New York: John Wiley & Sons
7. Ben Farmer & Hentie Louw., Companion to Contemporary Architectural Thought, London & New York: Routledge
8. Peter Noever (ed)., Architecture in Transition: Between Deconstruction and New Modernism., Munich: Prestel.

e-learning resources:

http://nptel.ac.in/courses.php
http://jntuk-coeerd.in/