GREEN BUILDINGS

(Professional Elective-3)

I I Semester

Course Code: 19CE2158	L	P	C
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Prerequisites: Building Materials and Construction

Course Outcomes:

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

CO1 Record the knowledge on Green Building objectives, climate and environment

CO2 Apply the knowledge in development of green field infrastructure in relation to sustainable environment

CO3 Demonstrate the passive energy system and components of building fabrics and materials

CO4 Express the knowledge on active energy systems, utilities and services and O&M

CO5 Express the knowledge on indoor air quality and building rating Systems

UNIT-I: (10 Lectures)

INTRODUCTION TO GREEN BUILDINGS.

Macro-environment: Elements of climate, Weather, Water cycle, Carbon cycle, Environmental quality, Deforestation, Climatic change, Ozone depletion and implications.

Micro-environment: Natural environment vis-à-vis built environment. Living environment characteristics and components of Urban Ecosystem, solar radiation, heat flow, air-movement, Landuse, drainage and sanitation.

Learning outcomes:

1. Illustrate about Green Buildings (L4)

2. Explain about the Macro and Micro-Environments (L2)
3. Discuss about ozone depletion (L2)

UNIT-II: (10 Lectures)
INFRASTRUCTURE DEVELOPMENT

Brownfield development and Greenfield development, sustainable site development, environmental impact and ecological balance, FAR, vegetation, landscape elements, rainwater harvesting, on-site sewerage retention, treatment, recycle and reuse.

Learning outcomes:

1. Illustrate the Concepts of Green Field Development (L4)
2. Discuss about vegetation, landscape elements, rainwater harvesting (L2)
3. Compare brownfiled and greenfield development (L5)

UNIT-III: (10 Lectures)
PASSIVE ENERGY SYSTEMS

Passive energy system design, Building envelope, orientation and components of building fabric and shading, modular building, Construction of curtain walls, Building materials - natural materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, ferro-cement and ferro-concrete, alternative roofing systems, paints for reducing the heat gain of the building, etc.

Learning outcomes:

1. Design Passive Energy System (L6)
2. Illustrate various aspects of Building materials (L4)
3. Explain the ferro-cement and ferro-cement (L2)

UNIT-IV: (10 Lectures)
ACTIVE ENERGY SYSTEMS

Active Energy Systems in buildings, Utilities and services, building automation. Electro-mechanical systems, lifts and transportation, captive power plant and equipment, operation & maintenance. Building energy analysis methods- Building energy simulation- Building energy efficiency standards.

Learning outcomes:

1. Illustrate Active Energy Systems in Buildings, building automation (L4)
2. Explain about lifts and Transportation, Captive Power Plant and Equipment (L2)
3. Discuss about building energy simulation (L2)

UNIT-V: (10 Lectures)

INDOOR COMFORT AND RATING SYSTEMS

Indoor air quality, fresh air requirements, standards, Thermal comfort-Ventilation and air quality-Air conditioning requirement- Visual perception- Illumination requirement- Auditory requirement, Sick Building Syndrome and causes.

Building auditing, rating agencies - IGBC, USGBC, GRIHA, TERI etc.

Learning outcomes:

1. Illustrate the aspects of Indoor Air Quality (L4)
2. Discuss about Systems of Building Ratings (L2)
3. Illustrate the building auditory requirements (L4)

Text Books:

1. Anil Kumar De, Arnab Kumar De, Environment and Ecology, 1st Ed, New Age International (P) Ltd., 2009.
2. Kibert, C.J., Sustainable Construction: Green Building Design and Delivery, 3rd Ed., John Wiley & Sons, 2005.
3. Koenigsberger, O.H., Manual of Tropical Housing and Building, 1st Edition, Orient Longman publishers, 2003.
4. Tom Woolley, Sam Kimmins and Rob Harrison, Green Building

Handbook, Vol. 1 & 2, Spon Press, 2009.

References:

1. Jagadish K.S., Venkatarama Reddy B.V. and Nanjunda Rao K.S., Alternative building materials and technologies, 1st Ed., New Age International (P) Ltd, 2015
2. John Littler and Randall Thomas, Design with Energy: The Conservation and Use of Energy in Buildings, 1st Ed., Cambridge University Press, 1984.
3. Levermore G.J., Building Energy Management Systems, 1st Ed., Taylor & Francis, 2000.

Internet:

Energy Conservation Building Code – 2017, https://beeindia.gov.in/sites/default/files/BEE_ECBC%202017.pdf