Semester: I/II			
Course Title	Green Buildings	**CIE Marks**	50
Course Code	BCVETC105/205B	**SEE Marks**	50
Course Type	Theory	**Total Marks**	100
Course Category	ETC	**SEE Duration**	03 hrs
Hours Per Week	3L : 0T : 0P	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives
This course will enable the students to
• Understand the definition, concept & objectives of the terms cost effective construction and green building
• Apply cost effective techniques in construction
• Apply cost effective technologies and methods in construction
• Understand the problems due to global warming
Pre-Requisites
• Basics of construction materials, alternative sources of energy, environmental studies

Module-1: Introduction to the Concept of Cost-Effective Construction	**(8 hrs)**
Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials- Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials	
Module-2: Environment friendly and Cost-Effective Building Technologies	**(8 hrs)**
Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks – Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.	
Module-3: Global Warming	**(8 hrs)**
Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of green v/s Conventional Building - Life cycle cost of Buildings.	
Module-4: Green Building Rating Systems	**(8 hrs)**
BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weightage. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Life cycle design of Materials and Structures (Concepts only).	

Module-5: Utility of Solar Energy in Buildings and Green Composites for Buildings	(8 hrs)
Utility of Solar Energy in Buildings Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **Green Composites for Buildings** Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.	
Text Books:	
1.	"Green Building Fundamentals" by G Harihara Iyer, 1st Edition, Notion Press.
2.	"Green Building: Principles & Practices" by Harshul Savla, 1st Edition, Notion Press.
Reference Books:	
1.	"Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination" by Karthik Karuppu, 1st Edition, Notion Press.
2.	"Handbook of Green Building Design and Construction LEED, BREEAM, and Green Globes" by Sam Kubba, 1st Edition, Joe Hayton publisher.
3.	"Sustainable Construction: Green Building Design and Delivery" by Charles J. Kibert, 5th Edition, Wiley Publication.

Course Outcome Statements: After the successful completion of the course, the student will be able to	
CO1	Select a suitable building material for construction, and also apply cost effective and environmentally friendly technology in buildings.
CO2	Analyze the effect of construction materials on global warming
CO3	Describe the characteristics of green buildings and analyze the buildings for green rating
CO4	Explain the effective use of solar energy, water and management of waste water in buildings.
CO5	Prepare a report on locally available cost effective and environment friendly building technologies.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	1	-	2	2	1	-	-	1	1
CO2	2	1	-	1	-	2	2	1	-	-	-	1
CO3	2	1	-	1	-	2	2	1	-	-	-	1
CO4	2	1	-	1	-	2	2	1	-	-	-	1
CO5	2	1	-	1	-	2	2	1	2	2	1	1
Avg.	**2**	**1**	-	**1**	-	**2**	**2**	**1**	**2**	**2**	**1**	**1**

3: High, 2: Medium, 1: Low

Suggested Activity Based Assessment (ABA) Methods

- Visit and list the locally available cost effective and environment friendly building materials.
- Visit the nearby construction sites and study the implementation of cost effective and sustainable building technologies.