22CEPE03	SUSTAINABLE AND GREEN BUILDING TECHNOLOGY	Semester			VI
PREREQUISITES	Category	PE	Credit		3
Construction Materials and Technology, Environmental Science and Engineering	Hours/Week	L	T	P	TH
		3	0	0	3

Course Learning Objectives

1	To Know various aspects of green buildings
2	To Use different steps involved in measuring environmental impact assessment.
3	To Relate the construction of green buildings with prevailing energy conservation policy and regulations.
4	To Know and identify different green building construction materials.
5	To Learn different rating systems and their criteria

Unit I	INTRODUCTION TO GREEN BUILDING AND DESIGN FEATURES	9	0	0	9

Definition of Green Building, Benefits of Green Building, Components/ features of Green Building, Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality.

Site selection strategies, Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction.

Unit II	ENERGY AUDIT AND ENVIRONMENTAL IMPACT ASSESSMENT	9	0	0	9

Meaning, Necessity, Procedures, Types, Energy Management Programs.

Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for civil engineering projects.

Unit III	ENERGY AND ENERGY CONSERVATION	9	0	0	9

Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, Biomass Energy.

Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels.

Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.

Energy-saving houses, Green House, Passive house, Passive house construction, Low-energy house, Zero-energy house, Energy consulting, Energy efficiency.

Unit IV	PRINCIPLES AND PLANNING OF GREEN BUILDING	9	0	0	9

Features: Salient features of Green Building, Environmental design (ED) strategies for building construction.

Process: Improvement in environmental quality in civil structure Materials: Green building materials and products-Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Non Toxic paint, green roofing.

Housing modernization and management (building and construction safety, energy efficiency in housing, Property Refurbishment / Upgrade / Modernization / Renovation - Modular kitchens, bathrooms

Unit V	RATING SYSTEM	9	0	0	9

Introduction to (LEED) criteria, Indian Green Building council (IGBC) Green rating, Green Rating for Integrated Habitat Assessment. (GRIHA) criteria Heating Ventilation Air Conditioning (HVAC) unit in green Building Functions of Government organization working for Energy conservation and Audit(ECA) - National Productivity council (NPC) Ministry of New and Renewable Energy (MNRE) Bureau of Energy efficiency (BEE) -BER (Building Energy Rating) - Certificates – Plumbing and Electrical to heating efficiency

	Total= 45 Periods
Text Books:	
1	Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hobouken, NewJersey, 3rd Edition, 2012.
2	Chauhan, D S Sreevasthava, S K., Non-conventional Energy Resources, New Age International Publishers, NewDelhi, 4th Edition, 2021
Reference Books:	
1	O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
2	Jagadeesh, K S, Reddy Venkatta Rama &Nanjunda Rao, K S., Alternative Building Materials and Technologies, New Age International Publishers,Delhi.
3	Sam Kubba., Handbook of Green Building Design and Construction, Butterworth- Heinemann.
4	Means R S, Green Building - Project Planning and Cost Estimating, John Wiley &Sons
5	Sharma K V, Venkataseshaiah P., Energy Management and Conservation, IK International.

Course Outcomes: Upon completion of this course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Understand the concepts of Green Building and its Design Features.	Understand
CO2	Assess Environmental Impacts.	Evaluate
CO3	Explain the concept of Energy and Energy Conservation.	Understand
CO4	Discuss the Principles and Planning of Green Building.	Understand
CO5	Summarize the green Building Functions in various organizations.	Understand

COURSE ARTICULATION MATRIX

COs/ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	1	1	2	3	-	-	1	2	1	2	-	-
CO2	-	1	1	2	-	-	-	1	-	2	-	-	1	3	-
CO3	-	-	3	-	3	-	-	-	-	2	2	-	-	-	-
CO4	1	-	-	-	3	-	-	-	-	2	2	-	-	-	-
CO5	1	1	2	3	3	-	-	-	-	3	2	-	-	3	-
Avg	1	1	2	2	2.5	2	3	1	-	2	2	1	1.5	3	-

3/2/1 – indicates strength of **correlation (3- High, 2- Medium, 1- Low)**