GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Civil Engineering
Semester – VII
Subject Name: Green Built Environment
Subject Code: 3170629

Type of course: Program Elective

Prerequisite: NIL

Rationale:

1. To develop a basic understanding about concept of green building.
2. To enable the students to apply the basic concepts of green building to address various green environment issues.
3. This course will provide students an opportunity to appear in an exam conducted by IGBC (Indian Green Building Council). On qualifying which the student will be able to achieve a tag of "**Associate Accredited Professional".** This tag further help the students to work as a consultant for green building / corridor practices.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.	% Weigh tage
1	**Sustainable Design:** Local Building Regulations, Soil Erosion Control, Natural Topography & Vegetation, Heat Island Effect, Roof & Non-roof, Passive Architecture, Universal Design, Green Parking Facility, Access to Amenities, Basic Facilities for Construction Workforce, Green Education & Awareness.	08	20
2	**Water Conservation:** Water Efficient Plumbing Fixtures, Rainwater Harvesting, Water Efficient Plumbing Fixtures, Landscape Design, Management of Irrigation System, Recycle & Reuse of Waste water, Water Quality, Enhanced Rainwater Harvesting, Water Metering.	09	23
3	**Energy efficiencies** HCFC Free Equipment, Minimum Energy Performance, Enhanced Energy Performance, Alternate Water Heating system, On-site Renewable Energy - Common area Lighting, Energy efficiency in common area equipment, Integrated Energy Monitoring System.	08	20

4	**Sustainable Building Materials:** Separation of House-hold Waste, Green Procurement Policy, Optimization on Structural Design, Certified Green Products, Local Materials, Eco friendly wood based materials, Alternative Construction Material, Handling of Construction & Demolition Waste, Organic Waste treatment Post Occupancy.	08	18
5	**Resident Health, Wellbeing & indoor environment quality:** Minimum Daylighting, 50%, Ventilation Design, No Smoking Policy, Enhanced Daylighting, Enhanced Ventilation Design, Cross Ventilation, Connectivity to Exteriors, Low VOC Materials, Paints & Adhesives, and Facility for Physical Wellbeing.	06	14
6	**Innovation & Development, exemplary case study:** Innovation, Exemplary Performance, case study	02	5

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15%	33%	30%	15%	5%	2%

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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.

Reference Books:

1. ASHRAE standard 90.1 -2010 performance rating method reference manual
2. National building code of India 2016 revised (NBC 2016)
3. ASHRAE standard 62.1 performance rating method reference manual
4. The Indian society of Heating, Refrigerating and air conditioning engineers ISHRAE code of Practice
5. Sustainable construction: Green buildings design & delivery- Charles J kibert
6. Green home building: money saving strategy for an affordable, healthy, high performance home by miki cook &Doug Garrett
7. Sustainable energy system engineering by Peter Gevorkian
8. Green building with concrete sustainable design & construction second edition by Gajanan M sabnis
9. Hand book of green building Design & construction: LEED, BREEAM7 green globes by Sam Kubba
10. Large scale solar power system design by Peter Gevorkian
11. The Eco home design guide: Principles & practice for new build & retrofit (sustainable buildings) by the Prince of Wales and Christopher day

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Course Outcomes: Student will be able to learn

Sr. No.	CO statement	Weightage
CO-1	Exposure to green concepts in design , construction & operation of buildings	25 %
CO-2	Exposure to green building trends & technology.	20%
CO-3	Enumerate the various mandatory and achievable green practices for green building and its rating system	25%
CO-4	Apply the sustainable ways of efficient utilization of resources in developing green building.	30%

List of Tutorials/Activities:

1. Passive Architect Design by simulation approach and prescriptive approach
2. Calculation of heat island reduction roof and non-roof
3. Rain water harvesting methodology
4. Analysis of light pollution reduction by prescriptive and simulation approach.
5. Universal design of building campus with basic workforce facility in green building guideline
6. Lead calculation for credit application to various parameters like green transportation, sustainable material lead.
7. Analysis of ozone depleting substances, CO_2 monitoring, organic waste management
8. Baseline flowrate / consumption analysis for various plumbing fixtures and management of various irrigation system
9. Compliance options of maximum threshold limit and global warming potentials.
10. Analysis of onsite and offsite renewable energy
11. Design criteria for low imitating materials and indoor air quality testing.