Sl. No.	Sub. Code	Theory	Contact Hours			Credit
			L	T	P/S	
4.4	22EAR7443	Elective 4. Green Architecture	3	0	0	3

Course Objective	To understand global environmental concerns and how these can be addressed through building design and active systems integration for sustainability.
Anticipated Learning Outcomes:	Ability to apply relevant codes for energy and environment, ascertain approximate renewable energy feasibility on projects, and configure systems integration for energy conservation.
Module 1 Sustainable Principles and Practices	Introduction to the ideas, issues and concepts of sustainable development; principles of environmentally and ecologically sensitive architecture; Importance of water, energy, materials and community in architecture for sustainable development. Brief introduction to green rating systems and criteria for evaluation of different categories of built development - IGBC, GRIHA and LEED rating systems.
Module 2 Green Building Design	Sustainable site planning and landscape design; Building form and orientation for sun and Wind. Building envelope design- Fenestration design, shading devices, facade treatment, efficient use of daylighting. Integrated Use of Landscape: Vertical Landscape, Green Wall, Green Roof.
Module 3 Solar Passive Techniques	Passive Heating techniques: General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems – Trombe wall and Solar Chimney. Passive Cooling techniques: General principles – Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, induced ventilation, earth sheltering, Wind Towers, Earth-Air tunnels, Air Vents.

	Case studies on buildings designed with passive heating and cooling techniques.
Module 4 Green Practices and Technologies	Energy utilization in buildings, Renewable and Non-Renewable energy sources. Integration of non-conventional energy systems from renewable source of energy-solar (photovoltaic), wind and biomass. Water conservation practices- Rainwater Harvesting systems; Recycling of waste water: Physical, Chemical and Biological treatment methods, Rootzone treatment, Use of recycled water. Environment friendly materials (paints, light sensitive glass, etc), Embodied energy of materials, Biodegradable materials, Recycling and Reuse of materials.
Module 5	Introduction to building performance simulation software (as decided by the faculty) Example- Autodesk Ecotect, IES (Integrated Environmental solutions), Radiance.

Note: Most Architectural subjects do not have Textbooks. The Reference books mentioned below are for reference only and University question paper should be prepared from the Syllabus descriptions.

References

1. *Sustainable design manual, Vols. 1& 2, The Energy and Resource Institute, New Delhi. Krishan, A. and Nick Baker, Climate Responsive Architecture: A Design Handbook for Energy*
2. *Efficient Buildings, McGraw Hill Education Private Limited, India, 2001.*
3. *Energy Conservation Building Code (ECBC), USAID-INDIA.*
4. *Szokolay, S.V., Introduction to Architectural Science - The Basis of Sustainable Design, Architectural Press.*
5. *Ralph Lebens M., Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.*