GREEN AND SMART BUILDINGS

Offering Branches	CE		
Course Category:	HONORS	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	Nil	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	**Illustrate** the concepts of Green building	K3
CO2	**Adopt** Renewable energy for buildings.	K3
CO3	**Implement** Automation techniques in buildings**.**	K3
CO4	**Demonstrate** Actuator techniques for Automation	K3
CO5	**Choose** appropriate materials for Green buildings	K3

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2			2	2							2
CO2		2	2			2	2							2
CO3		3	3			2	2							2
CO4		2	2			2	2							2
CO5		2	2			2	2							2
Avg.		2	2			2	2							2

Course Content

UNIT-1	**CONCEPT OF GREEN BUILDINGS** Green building initiatives, its origin, characteristics of a green building, green buildings in India, certification of green buildings. Criteria for rating – sustainability. Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials; green cement, biodegradable materials, smart materials, engineering evaluation of these materials. Case study.	**CO1**
UNIT-2	**SOURCES OF ENERGY** Renewable and non-renewable sources of energy ; coal, petroleum, nuclear, wind, solar, hydro, geothermal sources; potential of these sources, hazards, pollution; global scenario with reference to demand and supply in India. Energy arises. Carbon Emission: Forecasting, control of carbon emission, air quality and its monitoring carbon foot print; environmental issues, minimizing carbon emission.	**CO2**
UNIT-3	**INTELLIGENT BUILDINGS** Intelligent buildings-Building automation-Smart buildings- Building services in high rise buildings-Green buildings-Energy efficient buildings for various zones-Case studies of residence, office buildings and other buildings in each zones. Case Study.	**CO3**
UNIT-4	**ACTUATOR TECHNIQUES** Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.	**CO4**
UNIT-5	**MATERIALS FOR "GREEN" SYSTEMS** Green materials, including biomaterials, biopolymers, bioplastics, and composites Nanotech Materials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Paints, Roofs,Walls, and Cooling. Multifunctional Gas Sensors,	**CO5**

	Biomimetic Sensors, Optical Interference Sensors Thermo-, light-, and stimulus-responsive smart materials.	

Learning Resources

Text Books	1. Sustainable Construction , Charles J. Kibert.,Third Edition, ISBN-13: 978-0470904459, ISBN-10: 0470904453 2. Green Building A to Z, Jerry Yudelson.
Reference Books	1. Advanced Technology for Smart buildings,James Sinopoli, ISBN-13: 978-1608078653, ISBN-10: 1608078655
e-Resources Material	1. https://link.springer.com/book/10.1007/978-981-10-1002-6 2. https://www.elsevier.com/books/smart-buildings/casini/978-0-08-100635-1