J.S. University, Shikohabad

Established by UP Govt. Act No. 07 of 2015

Recognized by U.G.C. under section 2 (f) of Act-1956

Value Added Course

(Sustainable Materials And Green Building)

Faculty of CIVIL ENGINEERING

	J.S. University, Shikohabad Faculty of Civil Engineering	Value Added Course
		AY: 2020-21

Sustainable Materials And Green Building

Learning Objective:

This Course will provide knowledge of Sustainable material and green building

Duration: 30 Hours. (Theory and Practical)

Course Outcomes: -

Maximum Exposure has to be given on Practical Oriented

On successful completion of the course students will be able to:

1) Know to embodied energy, Operational energy in Building and Life cycle energy. Ecological foot print, Bio-capacity and calculation of planet equivalent.
2) Learn the role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission,Sustainability issues for concrete,
3) Understand the role of quality, minimization of natural resource utilization, High volume fly ash concrete, geo-polymer concrete etc. concrete with alternative material for sustainability'
4) Learn how to do reduction in water consumption in concrete, Recycled aggregate, Energy for grinding crushing of cement aggregate etc. and reduction. Operational energy in building role of materials and thermal conductivity

	J.S. University, Shikohabad Faculty of Civil Engineering	Value Added Course AY: 2022-22

Syllabus Outline

1. **Module-1**

   Introduction and Planet Equivalent
   Basics of Carbon Cycle, Factors Affecting carbon Cycle, Fundamentals of Sustainability, Role of Materials and Embodied Energy, Case Study for Energy in Building, Calculation of Ecological Footprint,

2. **Module-2**

   Role of Cement in Sustainability
   Calculation of Chemical Energy, Fuel for Cement, Cementitious/ Supplementary Cementitious Materials and Their Characterization, Strength of Concrete With Supplementary Cementitious Materials and Composite Cements, Types of Composite Cements, Alternative Fuel for cement and Embodied Energy, Life Cycle Embodied Energy and Concrete Sustainability, Strength of Concrete and Use of Admixtures, Curing Methods and Use of Waste Water for Mixing and Curing,

3. **Module-3**

   Modern Composite Concrete
   Recycled Aggregate-ITZ and Processing, Classification of Recycled Aggregate: Crushing and Grinding of Aggregates, Crushing and Grinding: Bond's Law+Operational Energy: U-Value, Operational Energy: Thermal Conductivity Models,

4. **Module-4**

   Thermal Diffusivity and Clay Bricks
   Types of Bricks Kilns and Carbon Balance, Carbon Balance, Comparison of Various Types of Brick Kilns and Sealants, Paints, Adhesive, Sealants, Health Hazards of Building Materials and Emission Models, Energy Efficient Design of Buildings, Design Optimization of Buildings, Building Design Optimization Using Genetic Algorithm,

5. **Module-5**

   Urban Heat Island
   Radiation Concepts, Urban Heat Island: Urban Canopy Layer, Evapotranspiration: Theory and Models, Evapotranspiration: Case Study and Surface Water Balance, Solar Energy and Solar Cells, Solar Photo Volatic Cells, Design Strategies and the Green Design Process, Autoclaved Aerated Concrete, Insulated Precast System and Insulated Precast Forms, Insulated Concrete Form and Tunnel Form, Modular Construction

	J.S. University, Shikohabad Faculty of Civil Engineering	Value Added Course
		AY: 2022-22

References:-

1) "Green Technolgy" by Mohd Firdaus Yhaya, Husnul Azan Tajarudin
2) "The Green Building Material Manual": A Reference To Environmentally Sustainable Initiativesand Evaluation Methods By Hannah Rae Roth And Liane Hancock

(Name of Faculty)	(Name of Faculty)	(Name of Faculty)
Course Coordinator	Dean Academics	Director/Principle/Dean of Faculty/Department
Er. Chhavi Lal	Dr. AK Lilesh	Er. Amit Yadav