**Lesson Plan**

**(ENERGY SCIENCE AND ENGINEERING.) (KOE-043)**

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| **S. No.** | **Content** | **Remark** |
| 1 | **UNIT-I Energy and its Usage:** Units and scales of energy use, Mechanical energy and transport, |  |
| 2 | Heat energy: Conversion between heat and mechanical energy, |  |
| 3 | Electromagnetic energy: Storage,  conversion, transmission and radiation, |  |
| 4 | Introduction to the quantum, energy quantization, Energy in chemical system and processes. |  |
| 5 | Flow of CO2, Entropy and temperature, |  |
| 6 | Carnot and Sterling ,heat engines, Phase change energy conversion, |  |
| 7 | Refrigeration and heat pumps, |  |
| 8 | Internal combustion  engines, |  |
| 9 | Steam and gas power cycles, the physics of power plants. |  |
| 10 | Solid-state phenomena  including photo, thermal and electrical aspects |  |
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| 12 | **Unit-II Nuclear Energy:** Fundamental forces in the universe, |  |
| 13 | Quantum mechanics relevant for nuclear physics, Nuclear forces, |  |
| 14 | Nuclear forces, energy scales and structure, |  |
| 15 | Nuclear binding energy systematics, reactions and decays, |  |
| 16 | Nuclear fusion, Nuclear fission and fission reactor physics, |  |
| 17 | Nuclear fission reactor design, safety, operation and fuel cycles |  |
| 18 | Nuclear fission reactor design, safety, operation and fuel cycles |  |
| 19 | **Unit-III Solar Energy:** Introduction to solar energy |  |
| 20 | fundamentals of solar radiation and its  measurement aspects, |  |
| 21 | Basic physics of semiconductors, Carrier transport, generation and recombination in semiconductors, |  |
| 22 | Semiconductor junctions: metal-semiconductor junction & p-n junction, |  |
| 23 | Essential characteristics of solar photovoltaic devices, |  |
| 24 | First Generation Solar Cells, Second Generation Solar Cells, |  |
| 25 | Third Generation Solar Cells |  |
| 26 | **Unit-IV Conventional & non-conventional energy source**: Biological energy sources and  fossil fuels, |  |
| 27 | Fluid dynamics and power in the wind, |  |
| 28 | Available resources, fluids, viscosity, types of  fluid flow, |  |
| 29 | Lift, Wind turbine dynamics and design, wind farms, |  |
| 30 | Geothermal power and ocean thermal energy conversion, |  |
| 31 | Tidal/wave/hydro power |  |
| 32 | **Unit-V Systems and Synthesis:** Overview of World Energy Scenario |  |
| 33 | Nuclear radiation, fuel cycles, waste and proliferation, |  |
| 34 | Energy conservation.  Engineering for Energy conservation: |  |
| 35 | Concept of Green Building and Green Architecture; |  |
| 36 | Green building concepts, LEED ratings. |  |
| 37 | Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates |  |
| 38 | Embodied energy analysis and use as a tool for measuring sustainability. |  |
| 39 | Energy Audit of Facilities and optimization of energy consumption |  |

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