**OPEN ELECTIVE-5 3E’s-Energy, Environment and Economics**

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| Semester | III |
| Paper code | CHOE-V |
| Paper title | 3E’s-Energy, Environment and Economics |
| Number of teaching hours per week | 3 |
| Total number of teaching hours per semester | 42 |
| Number of credits | 3 |

1. **INTRODUCTION: ENERGY BASICS 5 h**

Energy: units and measurement. A brief overview about the types of energy, conventional and non-conventional sources of energy, global energy resources and reserves, production and classification.

1. **RUNNING OUT OF ENERGY - THE NEW JURASSIC: NON-RENEWABLE SOURCES AND ENVIRONMENT 5 h**

Availability and economics of the global non-renewable energy resources: fossil fuels, natural gas, minerals and nuclear fuels, expert projections for the life time of these resources. consequences of these resources on the environment. (benefits of nuclear batteries to be added)

**Case study**: nuclear batteries, fossil fuel and nuclear fuel accidents in the Indian (Kalpakkam) and global context (Chernobyl, Fukushima Daiichi)

**RENEWABLE SOURCES: CLEAN AND GREEN ENERGY FOR A SUSTAINABLE WORLD 9 h**

Renewable sources: solar, wind, bio, hydro, tidal, ocean benefits of this energy on the environment, the flow of energy in the ecological system.

**Case Study**: environmental and economic impact of the solar and wind power stations set up globally and in India

1. **MY CARBON FOOTPRINT: ENVIRONMENTAL EFFECTS 14h**

Definitions: carbon footprint, ecological footprint, carbon watch, carbon pricing and carbon tax. Major contributors to carbon footprint, environmental degradation and pollution.

**Case study**: calculation of carbon footprint in St. Joseph’s College and also in urban transport in India.

1. **JOULES TO ₹: ECONOMICS OF GREEN ENERGY 9 h**

Determinants of energy supply and demand, relationship between energy prices and economic growth. The economic benefits of clean energy initiatives.

**Case study**: challenges for low-carbon project development; successful renewable energy projects in India.

**References:**

1. Martin Kaltschmitt. Wolfgang Streicher, Andreas Wiese, Renewable energy technologies, economics and environment, ISBN 978-3-540-70947-3 Springer Berlin Heidelberg New York.
2. David Timmons, Jonathan M. Harris, and Brian Roach, The Economics of Renewable Energy, A GDAE Teaching Module on Social and Environmental Issues in Economics Global Development and Environment Institute Tufts University Medford, MA 02155. <http://ase.tufts.edu/gdaex>
3. NITI Aayog and Rocky Mountain Institute (RMI). Towards a Clean Energy Economy: Post-COVID-19 Opportunities for India’s Energy and Mobility Sectors, 2020.
4. Energy Economics, Peter M. Schwarz, Routledge, 2018.
5. Nishad P, Mohammed Thanshayar et.al., Carbon Footprint: A Case Study, SSRG International Journal of Civil Engineering (SSRG - IJCE) – Volume 5, Issue 5 – May 2018, ISSN: 2348 – 8352. www.internationaljournalssrg.org

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| **Formative Assessment (Internal assessment) Theory** | |
| **Assessment Occasion/ type** | **Weightage in Marks** |
| Continuous evaluation and class test | 20 |
| Seminars/Class work | 10 |
| Assignments/Discussions | 10 |
| **Total** | 40 |