

Sem.	Course Code	Advanced Learner Course	Total Marks: 100		Hours Per Week	Credits
IV	17UAOAL407	Energy Physics	CIA: -	ESE: 100	-	2

### OBJECTIVES:

- To impart knowledge to the students to know the values of Non-Conventional energy sources
- To provide awareness in utilizing renewable energy resources

### COURSE OUTCOMES:

At the end of the course, Students will be able to

CO1: Classify conventional and non-conventional energy sources and their importance

CO2: Understand heat transfer mechanism

CO3: Gain insight over the requirement of solar collectors

CO4: Expand their views in utilization of solar energy for various household systems

CO5: Evaluate the principles of electronics in solar power generators

### UNIT I

**Conventional and Non-Conventional Energy Sources:** Fossil fuel resources – need for alternative energy resources – Biological conversation – Biogas – Geothermal – Ocean thermal energy conversation – Wind power – Tidal power – Nuclear power: Fission and fusion – solar production of hydrogen – Liquid hydrogen as a fuel in nature.

### UNIT II

**Sun and Heat Transfer:** The characteristics of sun – Solar constant - Electromagnetic energy spectrum – Spectral distribution of solar radiation –solar radiation at Earth’s surface –heat transfer – conduction – radiation - reflectivity – Transmissivity – Pyrheliometers – Pyranometers.

### UNIT III

**Solar Collectors:** Liquid flat plate collectors – General characteristics – Collection efficiency – Loss coefficient – Evaluation – Temperature distribution and mean plate temperature – Focusing type solar collectors – Concentrator and receiver geometrics – General characteristics of focusing collectors – Optic losses – Construction of reflectors.

**UNIT IV**

**Solar Heating and Refrigeration:** Solar air heaters – Application of solar water heaters – Collectors and storage tanks – Characteristics and performance of collectors – Storage of energy at high and low temperatures – Solar cooker – Selective coating.

Solar cooling system – Vapour compression systems and heat pump – Absorption air conditioning – Open cycle cooling systems – Natural methods of air conditioning

**UNIT V**

**Solar Power Generators:** Solar thermal power generation – Solar still – Solar pump – Solar pond - Conversion of light into electrical energy – Photovoltaic power generation – types of solar cells - Construction and characterization of solar cells - Fill factor – Efficiency- Applications of Solar Cells in Space.

**Text Books:**

1. G.D. Rai - Solar Energy Utilization –Edition 1993 - Khanna Publications, Delhi
2. C. G. Agarwal - Solar Energy – S. Chand & Co, NewDelhi.

**Reference Books:**

1. Solar Energy - S.P. Sukhatme – Edition 1996- Tata Mc Graw Hill Publications

<b>QUESTION PAPER PATTERN</b>		
<b>SECTION - A</b>	<b>SECTION - B</b>	<b>SECTION - C</b>
<b>10 x 2 = 20 Marks</b> Ten questions out of 12	<b>5 x 7 = 35 Marks</b> (Either or choice) Two questions from each unit	<b>3 x 15 = 45 Marks</b> (Answer any three Questions) One Question from each unit