

## **BEME805T: ENERGY CONVERSION - III (Theory)**

**CREDITS: 04**

### **Teaching Scheme**

Lectures: 3 Hours/Week

Tutorial: 1 Hour/Week

### **Examination Scheme**

Duration of Paper: 03 Hours

University Assessment: 80 Marks

College Assessment: 20 Marks

**Course Objectives and Expected Outcomes :** This course includes the current energy scenario, various energy conservation techniques, energy auditing, study of various non conventional energy sources and their significance in present energy crises.. This subject also helps the students in understanding various Hydraulics and Pneumatic techniques used in various applications & industries.

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### **UNIT – I**

**[ 8 Hrs.]**

**Gas Turbines:-**Ideal cycles isentropic and small stage efficiency, application of gas turbine pressure losses, effect of intercooling, reheat & regeneration, fuel-air ratio, combustion efficiency, performance calculation, open cycle & closed cycle gas turbine plants cogenerations & combined power cycles.

### **UNIT – II**

**[ 8 Hrs.]**

Principles & working of turbojet, turbo-prop, Ramjet & pulse jet, simple turbojet cycle, thrust power, propulsive power. Thermal efficiency, propulsive efficiency, overall efficiency.

Nuclear Power Plant: Introduction, nuclear reactor, classification, general components, operation, problems of reactor operation, site selection, comparison of nuclear plants with thermal plants. (analytical treatment is not expected)

### **UNIT – III**

**[ 8 Hrs.]**

Principle of solar energy collection, solar energy and sources of power generation, solar constant, solar geometry, flat plate & concentrating collectors for water and air heating, solar energy storage, solar pond, application of solar energy for cooking, drying, solar photovoltaic system & its applications. Introduction to fuel cell. Working of wind generators & MHD generator (theoretical treatment is expected)

### **UNIT – IV**

**[ 8 Hrs.]**

**Energy Auditing:** Introduction, global and Indian energy scenario, need of importance of energy conversion. importance of energy audit, uses of energy audit, basic terms of energy audit, types of energy audit, procedure for carrying energy audit, instruments used for energy audit such as power analyzer, multipoint heat flow meter, Lux meter, portable infrared radiation thermometer, thermocouple based temperature indicator. Payback period, Return on Investment (ROI), life cycle costs, Sankey diagram, specific energy consumption.

### **UNIT – V**

**[ 8 Hrs.]**

**Hydraulic systems:** Introduction, essential elements of a hydraulic system: Flow actuators, directional control valves, pressure control valves, flow control valves, accumulators, basic hydraulic circuit, meter in & meter out circuits. Use of single, double actuator, crane, jacks. Grinding machine.

## **UNIT – VI**

[ 8 Hrs.]

**Pneumatic Systems :** Principle of pneumatics, comparison with hydraulic power transmission. Study of various Compressors used in pneumatic system, air preparatory unit, pneumatic valve. Various Pneumatic circuits.

**LIST OF TUTORIALS:** Tutorials based on above syllabus.

### **TEXT BOOKS:**

1. Non-Conventional Energy Storage, Rai G.D., Khanna Ppublication.
2. Solar Energy Principles of Thermal Collection and Storage, Sukhatme, S.P., Tata McGraw Hill.
3. Industrial Hydraulics, John J. Pippenger, Tata McGraw Hill.
4. Pneumatic Systems, S. R. Mujumdar, Tata McGraw Hill.
5. Energy Conservation - related booklets published by National Productivity Council (NPC) & Petroleum Conservation Research Association.(PCRA).
6. Efficient Use of Electricity in Industries, B.G. Desai, M.D. Parmar, R. Paraman and B.S. Vaidya, ECQ series Devki R & D. Engineers, Vadodara.
7. Thermal Engineering, P.L. Ballaney, Khanna publishers.
8. Gas Turbine& Jet Propulsion, Dubey & Khajuriya, Dhanpat Rai & Sons.

### **REFERENCE BOOKS:**

1. Solar Energy Fundamentals and Applications, Garg, H.P., Prakash J., Tata McGraw Hill.
2. Gas Turbine Theory, Cohen and Rogers, Pearson.