Department: Mechanical Engineering    A.Y. 2023-24    Semester: II    Date:27.12.2023

Ref No:    Thermal Engineering Module

| Course Outline | |
|---|---|
| **Class: TY B Tech** | **Name of the Course: Non - Conventional Energy Systems (PEC-III)** |
| **Course type: PEC-III** | **Course Code: BME6503A** |
| Credits: 3 | Examination Structure |

| | IE | MTE | ETE | Total |
|---|---|---|---|---|
| | 20 | 30 | 50 | 100 |

**Course relevance:** The course covers vital aspects of renewable energy, focusing on solar, wind, biomass, geothermal, and tidal sources. It addresses global energy challenges, emphasizing practical applications, economic viability, and worldwide energy use. The course emphasizes practical applications, performance evaluation, and economic analysis, ensuring graduates are well-equipped to contribute meaningfully to the transition towards cleaner and sustainable energy solutions. The course cover a practical dimension to their skill set, enabling them to navigate the complexities of the renewable energy sector.

**Prerequisites:**

a. Fundamental concepts and laws/governing equations of Engineering Thermodynamics, fluid mechanics.

b. Principles of Heat Transfer

c. Elements of Electrical Engineering

*Table 1 Course Outcome and Mapping with POs and PSOs*

| CO | Statement | Learning Level | PO/ PSO Mapped | Tools for Assessment |
|---|---|---|---|---|
| CO1 | Estimate solar radiation on a tilted surface. | Apply | PO1, PO6    PO7 PO10 PSO1 | MTE, IE1, ETE, |
| CO2 | Determine the fundamental performance of characteristics of solar thermal. | Analyze | PO1, PO2,, PO3, PO4, PO10 PSO1, POS2 | MTE, IE1, ETE, |
| CO3 | Determine the fundamental performance of characteristics of photovoltaic energy generation. | Analyze | PO1, PO2,, PO3, PO4, PO10 PSO1, POS2 | MTE |
| CO4 | Estimate the potential of wind resources | Apply | PO1, PO2,, PO3, PSO1, POS2 | IE2, ETE, |
| CO5 | To differentiate various routes of biomass energy conversion systems and demonstrate their operation. | Apply | PO1, PO2, PO4, PSO1 | IE2, ETE, |
| CO6 | Illustrate the operation of geothermal and tidal power plants and determine their financial viability | Apply | PO1, PO2, PO4, PSO1 | ETE |

*Table 2 Internal Evaluation*

| CO | Statement | IE 1 Planning | IE 2 | MTE |
|---|---|---|---|---|
| **Weightages** | | 10 (Unit 1, 2) | 10 (Unit 4, 5) | 30  (Unit 1, 2,3) |
| **1,2, 3** | Estimate solar radiation on a tilted surface. Determine the fundamental performance of | After completion of Unit 1 and Unit 2 Students should submit the recorded videos on the topics from Unit 1 and Unit 2. | -- | MTE |

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**Pimpri Chinchwad College of Engineering**
Sector No. 26, Pradhikaran,
Nigdi, Pune – 411 044

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| | | | | |
|---|---|---|---|---|
| | characteristics of solar thermal. | | | |
| **4,5** | Estimate the potential of wind resources<br>To differentiate various routes of biomass energy conversion systems and demonstrate their operation. | -- | After completion of Unit 4 and 5, Class quizzes to be conducted each unit Multiple MCQ Type | |

**Table 3 Rubric for assessment of Internal Evaluation activities IE1**

| Criteria for assessment will be Time (20%), Presentation (40%), and Content (40%) | | | |
|---|---|---|---|
| Name of Activity | 7-10 Marks | 4-6 Marks | 0-4 Marks |
| Timely submission (20% weightage) (Ethics) | • Timely submission | • After soft reminder | • After due date |
| Content Quality (Technical) (40% weightage) | • Very good quality of referred material- book, report and research article.<br>• Analysis on the presented data | • Moderate quality of referred material- book, report and research article.<br>• Moderate discussion on analysis on the presented data | • No quality content from book, report and research article, only PPT preparation without analysis. |
| Presentation Skill (Skill) (40% weightage) | • Good Presentation<br>• Presentation in Slides<br>• Proper communication | • Presentation<br>• Presentation in Slides<br>• Proper communication | • Improper Presentation<br>• Improper presentation in Slides<br>• Improper communication |

**Teaching Plan for Theory Sessions**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO6 | PO7 | PSO1 | PSO2 | Total |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | | | 1 | 1 | 1 | | 7 |
| CO2 | 2 | 2 | 1 | 0.5 | | 0.5 | 1.5 | 0.5 | 8 |
| CO3 | 2 | 1 | 1.5 | 0.5 | | 0.5 | 1.5 | | 7 |
| CO4 | 3 | 2 | 1 | | | 1 | 1 | | 8 |
| CO5 | 2 | 2 | 1 | | | 1 | 1 | | 7 |
| CO6 | 3 | 2 | 1 | | | 1 | 1 | | 8 |
| | **15** | **10** | **5.5** | **1** | **1** | **5** | **7** | **0.5** | 45 |

**Marks Distribution**

| CO | IE1 | IE2 | MTE | ETE |
|---|---|---|---|---|
| Out of | 10 | 10 | 50 | 80 |
| Converted to | 10 | 10 | 30 | 50 |
| CO1 | 5 | -- | 15 | 5 |
| CO2 | 5 | -- | 15 | 5 |
| CO3 | -- | -- | 20 | 5 |
| CO4 | -- | 5 | -- | 20 |
| CO5 | -- | 5 | -- | 20 |
| CO6 | -- | -- | -- | 25 |

**Dr. A. B. Lingayat**
Course faculty  and Course
Coordinator