MASTER OFTECHNOLOGY IN ENERGY SCIENCE & TECHNOLOGY
EXAMINATION, 2024
(1stSemester)
INDUSTRIAL ENERGYANALYSIS

Time: Three hours Full Marks: 100

Part – I (Marks - 60)

Answer ***any three*** from the following questions.

1. (a) What do you understand by energy conservation? Explain the importance of energy analysis for industry. 3

(b) Mention different forms of energy used in an Industry. How do you quantify them? 4

(c) From the laws of thermodynamics explain the concept of energy conservation in any thermodynamic process. 5

(b) A certain water heater operates under steady flow conditions receiving 10 kg/s of water at 75°C temperature, enthalpy 313.93 kJ/kg. The water is heated by mixing with steam which is supplied to the heater at temperature 100.2 °C and enthalpy 2676 kJ/kg. The mixture leaves the heater as liquid water at temperature 100 °C and enthalpy of 419 kJ/kg. How much steam must be supplied to the heater per hour? 8

2. (a) What do you understand by material and energy balance? What is its purpose? 4

(b) What are different steps involve in effective Material and Energy Balance technique? Also explain its limitations. 5

(c) Why Sankey diagram is useful in energy balance calculations? 4

(d) What are the steps involved in CUSUM analysis? 7

3. (a) What do you understand by energy conservation possibilities in industrial motor? Explain. 5

(b) What are the philosophies for manufacturing energy efficient motor? Discuss in detail. 10

(c) Why power factor correction is needed? 5

4. (a) Define exergy and anergy. 2

(b) What are different methods of calculating boiler efficiency? Explain their advantages and disadvantages of each method. 6

(c) List down different Energy conservation opportunities in a steam system and explain them. 8

(d) What do you understand by blow down? Why it is needed? 4

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**M.TECH. ENERGY SCIENCE AND TECHNOLOGY**

**FIRST YEAR FIRST SEMESTER – 2024**

**Subject : INDUSTRIAL ENERGY ANALYSIS**

**Time : Three hours (Part I + Part II)** **Full Marks : 40**

**Part - II**

*Attempt any **two** of the following : -*

1. What do you mean by Energy System Maintenance? What are the advantages of such a system? How can you develop the maintenance program? What are the different systems available in an industry? What are the problems and maintenance action required for components like motor, oven and time clock? **(5x 4=20)**

2. What do you understand by Energy Monitoring and Targeting? What are the elements of Energy Monitoring and Targeting system? What is the function of a steam trap? What are the differences between thermocouple and thermopile? Name the boiler components to be examined for annual maintenance? **(5x4=20)**

3. What are the three different elements of an investment project? Define them. What do you mean by the term Depreciation, Amortization, Depletion and Capital Rationing?
In an industry, the revenue earned is Rs 2000 and total operating cost is Rs.600.The tax paid in this system is Rs.100. Find Gross Income and ATE. **(3+5+8+4=20)**