Ref. No. : Ex/ME(M2)/PE/B/T/325E/2024

B.E. MECHANICAL ENGINEERING THIRD YEAR SECOND SEMESTER – 2024

ENERGY CONSERVATION AND MANAGEMENT

Time: 03 hours **Full Marks: 100**

Answer any five questions
Answers to all parts of a question must be together
Very brief and to-the-point answers will be given better credit
Use of steam tables and charts is allowed

1. a) Define: i) Secondary energy, ii) Non-commercial energy, iii) Non-renewable energy. Give two examples of each. 6+6
   b) What is R/P ratio? Why is it important? 2+2
   d) What is DSM? Why is it even better than improving energy efficiency? 2+2

2. a) What is sustainable development? How energy conservation is relevant for it? 2+2
   b) Are energy efficiency and energy conservation identical? Explain in brief. 2
   c) How many types of power tariffs exist in India? What are major limitations of Indian power tariffs? 3+2
   d) What is energy intensity? Why is it important? 2+2
   d) State five co-benefits of energy conservation? 5

3. a) Draw a neat schematic of a two-pressure CCGT. Show the process of it in T-s diagram with possible pinch points. 6+4
   b) Three heat engines A, B and C are connected in series in a combined power cycle. If the efficiencies of these three engines are 0.5, 0.4 and 0.25 respectively, what is the overall efficiency of the combined cycle? 10

4. a) With neat sketches, show the schematics of back pressure and condensing-extraction cogeneration. For what type of load demands, these are suitable? 3+3+2
   b) What are EUF and $(EUF)_{vw}$? Which one is better and why? 6+2
   c) What is payback period? Is the lower value of it is always desired? 2+2

5. a) With a neat sketch, show the principle of operation of a heat pipe. Why is it an efficient device for gas to gas waste heat recovery? 6+2
   b) What are the different types of matrix used in a heat wheel? State one advantage and one disadvantage of each type. 4+8

6. a) What is continuous condition monitoring of an energy device? How is it useful for energy conservation? 2+2
   b) For the energy efficient operation of a boiler, briefly discuss about the role of continuous condition monitoring of the following: i) stack temperature, ii) oxygen in flue gas, iii) blow down, iv) variable speed control of auxiliary equipment. 4x4

7 Write short notes on: a) FESR, b) RoI, c) BEE activities, d) energy auditor 4X5