THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF INDUSTRIAL STUDIES (INDUSTRIAL MANAGEMENT)
INDUSTRIAL ENERGY MANAGEMENT – MEI 5260
FINAL EXAMINATIN 2009/2010

DATE: 5th APRIL 2010
TIME: 1400 HRS – 1700 HRS
DURATION: THREE HOURS

ANSWER FIVE QUESTIONS ONLY. ALL QUESTIONS CARRY EQUAL MARKS

(1) (i) Explain the concept of Combined Cycle Cogeneration. What are its advantages?

(07 marks)

(ii) Explain the topping cycle and the bottoming cycle with reference to cogeneration.

(06 marks)

(iii) What are the advantages and disadvantages of an open cycle gas turbine over a closed cycle type? Explain.

(07 marks)

(2) (i) Available large scale hydropower resources in Sri Lanka have now been fully utilised. Discuss the options available for Sri Lanka to meet future energy needs?

(10 marks)

(ii) Why are renewable energy resources not utilised to a significant extent in meeting the energy needs of developing countries?

(10 marks)

(3) (i) What are the responsibilities of an "Energy Committee" in a large manufacturing company?

(10 marks)

(ii) Explain in detail how an energy audit may be planned and conducted.

(10 marks)

(4) (i) Explain what is meant by "benchmarking."

(10 marks)

(ii) What are the advantages and disadvantages of internal benchmarking compared to external benchmarking?

(10 marks)

(5) (i) What is Net Present Value (NPV) and how is it calculated?

(05 marks)

(ii) A factory invests Rs. 10,000,000 in new plant at the beginning of the year and immediately commissions it. Savings expected over 5 years are given in the table below. In the fourth year, further expenditure of Rs. 1,000,000 is expected or replacement of certain parts.

Year	Saving (Rs.)
1	2,000,000
2	2,000,000
3	2,000.000
4	3,000,000
5	2,000,000

Find the NPV at the end of the 5th year if the discount rate is 12%.

(15 marks)

(6) Sri Lanka is now beginning to adopt zero energy concept for buildings due to rapid increase in energy cost in building services. What are the basic aspects that have to be considered in developing an energy management plan for buildings to minimise the energy cost?. Discuss the possible technologies that could be used to save energy in such buildings.

(20 marks)

(7) (i) What is waste heat recovery? Name three common waste heat recovery devices and explain their operation.

(15 marks)

(ii) A steam is used to preheat furnace oil from 30° C to 90° C . The mass flow rate of furnace oil is 50 kg/hr. The specific heat of furnace oil is 0.20 kCal/kg and the latent heat of steam is 540 kCal/kg. How much steam is required per hour?

(05 marks)

(8) (i) Explain the concept of "Emission Trading" and describe its three components as set out in the Kyoto Protocol.

(10 marks)

(ii) Write short notes on **any two** of the followings

- PDCA cycle
- Six sigma
- Losses in a boiler and measures for reducing them

(10 marks)

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