Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Regular Examination June 2023 (2019 Scheme)

Course Code: EET424

Course Name: ENERGY MANAGEMENT

Max. Marks: 100   **Duration: 3 Hours**

PART A

Answer all questions, each question carries 3 marks.   Marks

1	List down six general principles of energy management	(3)
2	Define Energy Audit and explain the need for Energy Audit.	(3)
3	Compare the efficacy of any three light sources.	(3)
4	Explain the different types of losses in an electric motor.	(3)
5	Discuss the benefits of demand side management	(3)
6	Explain the benefits of power factor improvement.	(3)
7	What are the two sources of feed water in a boiler system? What is the need for feed water treatment?	(3)
8	What is meant by cogeneration and list its advantages?	(3)
9	What is simple pay-back period? A new small cogeneration plant installation is expected to reduce a company's annual energy bill by Rs.4,86,000/-. If the capital cost of the new boiler installation is Rs.22,20,000/- and the annual maintenance and operating costs are Rs.42,000, calculate the expected payback period for the project?	(3)
10	Explain about Computer Aided Energy Management System.	(3)

PART B

Answer any one full question from each module, each question carries 14 marks.

Module I

11	a)	Explain the different phases of energy management planning.	(8)
	b)	Write notes on Building Management System.	(6)

OR

12	a)	Explain the different steps involved in detailed energy audit	(8)

b) Discuss the different instruments used for energy audit. (6)

Module II

13 a) Explain the various energy management opportunities in lighting systems (8)

b) Define cascade efficiency of an electrical system. How it can be calculated? (6)

OR

14 a) Explain the various energy management opportunities in electric motors. (8)

b) Explain the design measures for increasing efficiency in electrical system components. (6)

Module III

15 a) Explain the different techniques of demand side management. (6)

b) An industrial load consists of (i) a synchronous motor of 73.5 kW (ii) induction motors aggregating 147.1 kW, 0·707 power factor lagging and 82% efficiency and (iii) lighting load aggregating 30 kW. The tariff is Rs 100 per annum per kVA maximum demand plus 6 paise per kWh. Find the annual saving in cost if the synchronous motor operates at 0·8 p.f. leading, 93% efficiency instead of 0·8 p.f. lagging at 93% efficiency. (8)

OR

16 a) Discuss the importance of peak demand control. Explain the different methods used for that. (8)

b) Explain the different types of ancillary services. (6)

Module IV

17 a) Discuss the energy saving opportunities in boilers. (7)

b) Explain various energy conservation opportunities in furnaces. (7)

OR

18 a) What are the energy saving opportunities in waste heat recovery system? (7)

b) Explain various types of cogeneration systems. (7)

Module V

19 a) An energy audit in a factory indicates that the total electrical consumption per year is Rs. 5.5×10^{6}. By upgrading a few motors with high efficiency motors, a 15% saving in energy can be realized. The additional cost of energy efficient motors is Rs. 4,25,000 and the installation cost is Rs. 80,000. Assuming a 15 year life cycle, is the expenditure justifiable on a minimum return of 20 %. Conduct an economic analysis using present worth method. (8)

b) Differentiate between simple pay back period and net present value method. (6)

OR

20 a) Explain what do you mean by Life Cycle Costing approach (LCC). (10)

b) Consider a project which has the following cash flow stream. The cost of capital, (4) k, for the firm is 10 percent. Calculate the Net Present Value of the proposal?

Investment	Rs. (1,000,000)
Saving in Year	Cash flow
1	200,000
2	200,000
3	300,000
4	300,000
5	350,000

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