Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(S), OCTOBER 2019

Course Code: EE474

Course Name: ENERGY MANAGEMENT AND AUDITING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1	Explain the types of industrial load. Draw the torque and power versus speed characteristics of each type of loads.	(5)
2	Explain the energy management opportunities in motors	(5)
3	What are the two sources of feed water in a boiler system? What is the need for feed water treatment?	(5)
4	What is meant by waste heat recovery? What are the direct and indirect benefits of waste heat recovery?	(5)
5	Define the term cogeneration. Explain how cogeneration is advantageous over conventional power plant	(5)
6	Define gas turbine cogeneration system with figure.	(5)
7	What is meant by simple payback period? Calculate simple payback period for a boiler that cost Rs.75.00 lakhs to purchase and Rs.5 lakhs per year on an average to operate and maintain and is expected to annually save Rs.30 lakhs?	(5)
8	Calculate the net present value over a period of 3 years for a project with an initial investment of Rs 50,000 and fuel cost savings of Rs 30,000 in each year. The discount rate is 16%.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	A paper manufacturing company has a contract demand of 5000 kVA with the power supply company. The average maximum demand of the plant is 3850 kVA/month at a power factor of 0.95. The maximum demand is billed at the rate of Rs.500/kVA/month. The minimum billable maximum demand is 75% of the contract demand. An incentive of 0.5% reduction in energy charges component of electricity bill is provided for every 0.01 increase in power factor over and above 0.95. The average energy charge component of the electricity bill per month for the plant is Rs. 20lakhs. The plant decides to increase the power factor	(10)

to unity by installing capacitor banks. Find the annual reduction in demand component charges and energy component charges? Find the kVAR required to improve the power factor from 0.95 to unity?

10 a) Define Energy Management. What are the objectives of energy management? (5)

b) Explain any five energy management opportunities in lighting systems (5)

11 a) What are the energy management opportunities in electrolytic processes? (5)

b) What is meant by loading of motor? Why does the efficiency of motor reduce when it operates at lower loading? List down any 2 steps to improve the operating efficiency of under-loaded motors. (5)

PART C

Answer any two full questions, each carries 10 marks.

12 What is meant by internal and external feed water treatment in boilers? (10)

13 a) What is meant by steam traps? Explain the operation of thermostatic steam trap (5)

b) Explain any five energy conservation measures adopted in HVAC system (5)

14 a) How capacity of an HVAC system is mentioned? What is meant by coefficient of performance? (5)

b) Explain how setting a lower evaporator temperature helps in reducing the power consumption of an air conditioning system? List down any three energy saving measures in domestic air conditioning system (5)

PART D

Answer any two full questions, each carries 10 marks.

15 What are the different types of energy audit? Explain the steps involved in detailed energy audit. (10)

16 a) List down the major energy audits instruments and its use. (5)

b) Differentiate between simple payback period and net present value method (5)

17 What is meant by average rate of return method of financial analysis and explain its advantages. Calculate the ARR of a project whose details are given below. (10)

Year	Investment value	Profit after tax
1	80000	18000
2	90000	22000
3	65000	24000
4	60000	28000
5	55000	30000
6	50000	32000

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