

Total No. of Questions : 8]

SEAT No. :

P-6679

[Total No. of Pages : 2

[6181]-247

B.E. (Mechanical)

ENERGY AUDIT AND MANAGEMENT

(2019 Pattern) (Semester - VIII) (402050B) (Elective - V)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) a) What is sensitivity and risk analysis? Explain the factors affecting sensitivity and risk analysis. [9]

b) Investment for an energy proposal is Rs.10.00 lakhs, Annual savings for the first three years is 1,50,000, 2,00,000 & 3,00,000. Considering cost of capital as 10%, what is the net present value of the proposal? Will project meet the firms expectation? [8]

OR

Q2) a) Cost of an heat exchanger is Rs.1.00 lakhs .Calculate simple payback period considering annual saving potential of Rs.60,000/- and annual operating cost of Rs. 15,000/-. [5]

b) Explain various types of cash flows for an investment. [4]

c) Describe the factors influencing costing of steam, compressed air, natural gas and Electricity. [8]

Q3) a) Calculate pump efficiency from the data given: pump flow is 0.40 m³/s, power absorbed: 325 KW, suction head+1m. Delivery head 55m, motor efficiency 88%, type of drive: direct coupled, density of water 996 kg/m³. [10]

b) Enlist the types of stream traps and explain any two with a neat sketch.[8]

OR

P.T.O.

- Q4) a)** What are different Energy Conservation Opportunities in Boiler System? [8]
- b) A centrifugal pump is pumping $85\text{m}^3/\text{hr}$ of water and pressure rise in the pump is $6\text{kg}/\text{cm}^2$. If power drawn by motor is 25KW . Find out the pump efficiency. Assume motor efficiency as 90% & water density as $998\text{ Kg}/\text{m}^3$. [10]

- Q5) a)** Explain in detail the step by step approach for maximum demand control. [7]
- b) The lighting connected load for the small industry consisting of 140 Fluorescent tubes of 55 W each with magnetic ballast. In first option, the magnetic ballast of Fluorescent tubes is replaced by electronic ballast & power consumption of same fluorescent tubes reduces to 40W . Calculate the simple payback period of above replacement if cost of electronic ballast is $\text{Rs.}110$. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20 W & cost of $\text{Rs.}450$ each. Calculate simple payback period. Which energy saving option is better & why? Consider usage of 16 hrs per day & an electrical tariff of $\text{Rs.}4$ per KWh . [10]

OR

- Q6) a)** Discuss how selection and location of transformer affect the power factor. [7]
- b) The connected load for the hostel are as below.
- i) 190 Fluorescent tubes of 55W each with magnetic ballast.
 - ii) 20 Fluorescent tubes of 40W each with electric ballast.
 - iii) 20 old fan of 100W each.
- It is decided to replace the all tubes with new tubes of 20W and all Old fans by a new fan of 80W . Considering usage of 6Hrs per day & an electrical tariff of $\text{Rs.}4$ per KWh . Calculate energy saving of tubes & fans replacement. [10]

- Q7) a)** Explain the topping cycle & the bottoming cycle of co-generation with examples. [8]
- b) Write a short note on i) CDM projects ii) Carbon credit. [10]

OR

- Q8) a)** Explain cogeneration cycle with sketch and suitable examples. [8]
- b) Explain the various types of recuperators with schematic sketch. [10]

