

N. B.:

1. Attempt any FOUR Questions.
2. Use illustrative diagrams wherever required.

- Q1) a) Differentiate between commercial and non-commercial energy, primary and secondary energy. 10
- b) Explain how to carryout material and energy (M&E) Balance. Draw energy balance diagram for thermal power plant. 10
- Q2) a) Name the parameters measured by following energy audit instruments. 1. Fyrite 2. Ultrasonic flow meter 3. Thermal imager or IR gun 4. Stroboscope 5. Tachometer. List one application each of above instruments. 10
- b) Annual savings after replacement of boiler for three years is Rs. 5, 00,000, Rs. 5, 50,000, Rs. 6, 50,000. Total project cost is Rs 13.5 lakh. Considering cost of capital as 12%, what is the net present value of the proposal? 10
- Q3) a) Explain Time of Day (TOD) Tariff and how it is beneficial for the power system and consumers? Give short description about Availability Based Tariff (ABT). 10
- b) List all the possible energy conservation measures possible in lighting system? 10
- Q4) a) "Steam should always be utilised at the lowest possible pressure" – What are the important aspects to be considered before fixing up the steam pressure for a particular application? 10
- b) Briefly explain the methodology of refrigeration plant energy audit? 10
- Q5) a) A cooling water pump connected to pillar furnace, the specifications of the pump are as follows: $Q = 12.5$ lps, $H = 60$ M, $P = 13.4$ kW
As per the pillar furnace manufacture, required quality is 12.5 lps at 3.0 kg/cm². What type of energy conservation measure can be proposed and estimate the reduction in power consumption. 10
- b) Compare the techno-economics of replacing 400 W HPMV lamps with 250 W HPSV, 250 W HPMV with 150 W HPSV and 125 W HPMV with 70 W HPSV lamps for same light output for 4500 hours of annual operation and consider Rs. 4.5 as per unit cost? 10
- A 400 watt HPMV lamp can be replaced by a 250 watt HPSV or metal halide lamp without any change in light output (though color rendering effect may be different). Similarly 250 watt & 125 watt HPMV lamps can be replaced by 150 watt & 70 watt HPSV / metal halide lamps. Savings due to these replacements are worked out below considering 4500 hrs of operation at Rs.4.50 per unit of energy.
- Q6) a) What do you mean by ECBC? Which components must be considered while making building alterations by ECBC? 10
- b) Explain the use of Non-Conventional and Renewable Energy Sources in commercial buildings like hospital, school, hotel and shopping malls. 10