

3 hours

80 Marks

N. B. :

1. Question number 1 is **compulsory**.
2. Attempt any **THREE** from question number 2 to 6
3. Use illustrative diagrams wherever required

| Q. No. | Marks |
|--------|-------|
|--------|-------|

Q1) Attempt any **FOUR** questions

- a) What is main objective of Electricity Act, 2003? **05**
- b) Define specific power consumption (SPC) with an example. A compressor generates 100 cfm of air. The power drawn by the motor is 18 kW. Find its SPC. **05**
- c) Why Sankey diagram is useful in energy balance calculations? Draw Sankey diagram for domestic gas stove. **05**
- d) What are the impacts of steam leakages on the performance of boiler? **05**
- e) Enlist any **THREE** types of lamps and write their significant features. **05**

- Q2) a) Briefly describe the economic reforms in coal, oil and natural gas and electricity sectors in India. **10**
- b) Define energy management. Distinguish between 'preliminary energy audit' and 'detailed energy audit'? **10**

- Q3) a) Annual savings after replacement of HVAC plant for year 2019 is Rs. 5,00,000, for year 2020 is Rs. 5,50,000, and for year 2021 is 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**
- b) What are the base line data that an audit team should collect while conducting detailed energy audit of thermal power plant? **10**

| Q. No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks |
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| <p><b>Q4) a)</b> During April-2022, the university has recorded a maximum demand of 600 kVA and average PF (power factor) is observed to be 0.82 lag. The minimum average PF to be maintained is 0.92 lag as per the independent utility supplier and every one % dip in PF attracts a penalty of Rs 10,000/in each month.</p> <p>a) Calculate the improvement in PF for May-2022 by installing 100kVAr capacitors.</p> <p>b) Calculate penalty to be paid if any during May-2022.</p> <p><b>b)</b> List all the possible energy conservation measures possible in HVAC system.</p>                                                                                                                                                                  | 10    |
| <p><b>Q5) a)</b> In a plant, a boiler is generating saturated steam of 10 TPH at a pressure of 7 kg/cm<sup>2</sup>(g) with furnace oil (FO) as a fuel.</p> <p>Feed water temperature = 60°C</p> <p>Evaporation ratio = 14.</p> <p>Calorific value of FO = 10000 kcal/kg</p> <p>Specific gravity of FO = 0.95.</p> <p>Enthalpy of steam at 7 kg/cm<sup>2</sup>(g) = 660 kcal/kg</p> <p>Find out the efficiency of the boiler by direct method and volume of furnace oil tank (in m<sup>3</sup>) required for 120 hrs of operation.</p> <p><b>b)</b> Explain how a Variable Frequency Drive saves power in a three phase electric motor driven pumping system? What will be the reduction in power drawn by a motor by reducing the speed by half?</p> | 10    |
| <p><b>Q6) a)</b> What do mean by ECBC? Discuss the schemes of government regarding implementation of ECBC in shopping mall.</p> <p><b>b)</b> Write short notes on</p> <p>1. How to convert housing society into Green Building</p> <p>2. LEED rating</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10    |

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