

7. Classify which of the following is NOT a type of air compressor CO1- U
 - a) Reciprocating compressor
 - b) Rotary compressor
 - c) Turbo compressor
 - d) Hydraulic compressor
8. Explain the main factor affecting the efficiency of an air compressor CO1- U
 - a) Air humidity
 - b) Air pressure setting
 - c) Motor size
 - d) Compressor
9. Explain the primary benefit of power factor improvement. CO1- U
 - a) Reduced system efficiency
 - b) Increased line losses
 - c) Lower energy costs
 - d) Increased demand charges
10. Demonstrate the main function of an automatic power factor controller (APFC) CO1- U
 - a) Reduces system voltage
 - b) Maintains a constant power factor
 - c) Increases the power factor manually
 - d) Regulates the transformer losses

PART – B (5 x 2= 10 Marks)

11. Classify Commercial and Non-commercial energy sources CO1- U
12. Classify the methods for preparing process flow diagrams CO2- U
13. Compare the key properties of fuel oil, coal, and gas. CO3 -U
14. Explain how air compressor operation can be made more efficient CO4 -U
15. Explain electrical load management and how maximum demand is controlled CO5 -U

PART – C (5 x 16= 80Marks)

16. (a) Analyze how different energy pricing strategies such as subsidies, carbon pricing, and time-of-use tariffs can influence energy consumption patterns. Propose a pricing framework for a developing country that aims to ensure energy affordability while promoting conservation. Justify your proposal by discussing its economic and environmental implications. CO4-Ana (16)
- Or
- (b) A manufacturing industry is identified as a designated consumer under the Energy Conservation Act 2001. Discuss how the Act and its 2010 amendments can be applied to reduce the facility's energy consumption. Propose an actionable plan, including energy audits and mandatory measures, while analyzing the challenges in implementation. CO4- Ana (16)

17. (a) Explain the financial analysis techniques used for evaluating energy projects, including simple payback period, return on investment (ROI), net present value (NPV), and internal rate of return (IRR). Apply these techniques to assess the feasibility of an industrial energy-saving project, providing calculations and interpretations of results. CO1- U (16)
- Or
- (b) Discuss the roles and responsibilities of an energy manager in ensuring efficient energy use within an organization. Highlight the importance of location-specific energy management strategies and how they align with organizational goals. Suggest a framework for employee training and planning to support energy management initiatives. CO1- U (16)
18. (a) Classify the different types of industrial furnaces and discuss general fuel economy measures applicable to them. Analyze the role of excess air, temperature control, draft control, and waste heat recovery in improving furnace efficiency. Provide recommendations for reducing heat losses and maximizing energy savings in furnace operations. CO3- Ana (16)
- Or
- (b) Analyze the properties of steam and their critical role in industrial processes. Examine how steam distribution losses, steam leakage, and improper steam trapping contribute to inefficiencies. Differentiate between various energy-saving measures, including flash steam recovery, and assess their effectiveness in improving the overall efficiency of steam systems. CO3- Ana (16)
19. (a) Implement the key considerations for selecting a diesel generating system for industrial use and demonstrate methods for assessing its energy performance. Utilize key efficiency factors to identify areas for energy conservation and develop practical strategies to enhance energy performance while minimizing operational costs. CO2- App (16)
- Or
- (b) Apply the working principle of the vapor compression refrigeration cycle to emphasize the role of refrigerants and the coefficient of performance (COP). Utilize key factors affecting the efficiency of refrigeration and air conditioning systems to identify energy-saving opportunities. Develop strategies to enhance performance and reduce energy consumption in refrigeration systems. CO2- App (16)

20. (a) Implement the key considerations for selecting a diesel generating system for industrial use and demonstrate methods for assessing its energy performance. Utilize key efficiency factors to identify areas for energy conservation and develop practical strategies to enhance energy performance while minimizing operational costs.. CO2- App (16)

Or

- (b) Implement the appropriate selection of pumps for industrial applications to enhance system operations. Employ effective flow control techniques to improve pump efficiency and reduce energy waste. Develop optimization strategies focusing on system configuration, maintenance protocols, and advanced control measures to achieve energy savings and reliable performance. CO2- App (16)