Question Paper Code	13995

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025
Third Semester
M.E. - Power Electronics and Drives
24PPEEL306 - ENERGY MANAGEMENT AND AUDITING
Regulations - 2024

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	1. Which of the following is the *primary objective* of an energy management program? (a) Increasing energy bills (b) Reducing energy consumption and cost (c) Promoting fossil fuel usage (d) Ignoring energy audits	1	K1	CO1
2.	During the energy audit process, which step involves identifying areas of significant energy loss? (a) Preliminary data collection (b) Detailed energy analysis (c) Equipment calibration (d) Report formatting	1	K1	CO1
3.	The time value of money in energy cost analysis implies that: (a) Money has the same value at all times (b) Future money is worth more than present money (c) Present money is worth more than future money (d) Energy cost does not depend on time	1	K1	CO2
4.	Which demand control technique helps reduce peak load charges by shifting loads to off-peak hours? (a) Load shedding (b) Load levelling (c) Load shifting (d) Load scheduling	1	K1	CO2
5.	The efficiency of an induction motor can be improved by: (a) Reducing power factor (b) Overloading the motor (c) Operating near its rated load (d) Running at no load	1	K1	CO3
6.	Which equipment is primarily used to improve power factor in electrical systems? (a) Transformer (b) Synchronous condenser (c) Induction motor (d) Circuit breaker	1	K1	CO3
7.	Which type of meter measures both active and reactive power in modern energy systems? (a) Electromechanical meter (b) Solid-state multifunction meter (c) Induction-type energy meter (d) Tachometer	1	K1	CO4
8.	The burden of an instrument transformer refers to: (a) Power loss in the meter (b) Voltage drop across the secondary winding (c) Electrical load connected to the secondary (d) Efficiency of measurement	1	K1	CO4
9.	Which lighting control strategy provides maximum energy savings in modern buildings? (a) Manual switching (b) Time-based control (c) Occupancy sensors (d) Fixed illumination control	1	K1	CO5
10.	Cogeneration is best described as the: (a) Separate production of heat and electricity (b) Combined generation of heat and electricity from a single source (c) Use of renewable energy only (d) Generation of heat without electricity	1	K1	CO5

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K-Level	CO
11.	List the major steps involved in the energy audit process.	2	K1	CO1
12.	Define energy management and state its primary objective.	2	K1	CO1
13.	Define the term time value of money and its relevance in energy cost analysis.	2	K1	CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13995**

14.	Explain the purpose of demand control techniques in load management.	2	K2	CO2
15.	List any four factors affecting the efficiency of electric motors.	2	K1	CO3
16.	Describe the role of capacitors in improving power factor.	2	K2	CO3
17.	What is meant by instrument transformer burden?	2	K1	CO4
18.	Explain the difference between demand meters and energy meters.	2	K2	CO4
19.	List the major components of a lighting system.	2	K1	CO5
20.	What is cogeneration, and how does it improve energy efficiency?	2	K1	CO5
21.	Explain the concept of energy monitoring, targeting, and reporting (MT&R).	2	K2	CO2
22.	What are utility rate structures? Give an example.	2	K1	CO2

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Compare manual and automated energy monitoring methods and discuss the steps involved in plan, implement, analyse an energy management program.	11	K2	CO1
		OR			
	b)	With neat flow, explain the steps in energy audit and energy accounting.	11	K2	CO1
24.	a)	Discuss on the steps involved in designing and starting an energy management program.	11	K2	CO2
		OR			
	b)	Discuss in detail the various economic models used for energy cost evaluation with examples.	11	K2	CO2
25.	a)	A synchronous condenser is to be installed in a steel plant to support reactive power. How will you determine the rating of the condenser and its effect on system voltage profile and energy losses?	11	K3	CO3
		OR			
	b)	A three phase, 10 kW motor has the name plate details as 415V, 18.2 A and 0.9 PF. Actual input measurements shows 415 V, 12 A and 0.7 PF which was measured with power analyzer during motor running. Determine motor loading.	11	K3	CO3
26.	a)	Explain various metering techniques used in energy management with suitable practical examples.	11	K2	CO4
		OR			
	b)	Explain the features and functions of multitasking solid-state meters. Compare them with conventional meters.	11	K2	CO4
27.	a)	Assess the impact of cogeneration on overall energy efficiency and greenhouse gas reduction for a given load profile.	11	K4	CO5
		OR			
	b)	Examine how advanced lighting control strategies like occupancy sensors and daylight harvesting can optimize lighting energy usage in commercial buildings.	11	K4	CO5
28.	a)	(i) Discuss how metering location affects measurement accuracy and system monitoring.	6	K2	CO4
		(ii) Explain how lighting systems and cogeneration contribute to overall energy conservation in industries.	5	K2	CO5
	b)	**OR**			
		(i) Derive the expression relating disc speed to power.	5	K2	CO4
		(ii) Compare two different lighting energy optimization methods and justify which is more suitable for an industrial setup.	6	K2	CO5