

Reg. No.

Question Paper Code

13183

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Seventh Semester

Electrical and Electronics Engineering

20EEEL703 - ENERGY MANAGEMENT AND AUDITING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

Marks K-Level CO

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|---|---|----|-----|
| 1. The empirical relationship used to plot production VS Energy consumption is (Y=energy consumed for the period; C=fixed energy consumption; M=energy consumption directly related to production; X=production for the same period.) | 1 | K1 | CO1 |
| (a) $X=Y+MC$ (b) $Y=Mx+C$ (c) $M=Cx+Y$ (d) None of the above | | | |
| 2. What is CUSUM? | 1 | K1 | CO1 |
| (a) Counter Sum (b) Calculated Sum (c) Cumulative Sum (d) Cuber some | | | |
| 3. EUI is the ratio of _____. | 1 | K1 | CO1 |
| (a) Total Btu computed to the Total number of square feet of conditioned space | | | |
| (b) Production to the energy consumed | | | |
| (c) Total number of square feet of conditioned space to the Total Btu computed | | | |
| (d) None of the above | | | |
| 4. If the load current decreases then the power factor | 1 | K1 | CO2 |
| (a) Will also decrease (b) Will increase | | | |
| (c) Will remains unchanged (d) None of these | | | |
| 5. Shunt capacitors connection is normally adopted for | 1 | K1 | CO2 |
| (a) Distribution Voltage improvement (b) Power factor improvement | | | |
| (c) Both a and b (d) None of these | | | |
| 6. The power factor of a synchronous motor | 1 | K1 | CO2 |
| (a) Improves with increase in excitation and may even become leading at high excitations | | | |
| (b) Decreases with increase in excitation | | | |
| (c) Is independent of its excitation | | | |
| (d) Increases with loading for a given | | | |
| 7. The feasibility study of cogeneration evaluates the facility's _____ profile to determine the size of the chp system required. | 1 | K1 | CO3 |
| (a)Electrical load (b) Capital costs (c) Energy savings (d) Thermal load | | | |
| 8. What is a key economic factor considered in the feasibility analysis of cogeneration? | 1 | K1 | CO3 |
| (a) Compliance with environmental regulations | | | |
| (b) Estimating capital costs for installation | | | |
| (c) Assessing emissions reduction | | | |
| (d) System integration with existing infrastructure | | | |
| 9. What is the main objective of cogeneration systems like combined Heat and Power (chp)? | 1 | K1 | CO3 |
| (a) Produce electricity efficiently | | | |
| (b) Produce electricity only | | | |
| (c) Produce heat only | | | |
| (d) Reduce environmental impact and achieve cost savings | | | |
| 10. Which lighting control system automatically adjusts artificial lighting based on the availability of natural light? | 1 | K1 | CO4 |
| (a) Occupancy sensors (b) Daylight harvesting | | | |
| (c) Time based control (d) Dimming controls | | | |

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| 11. What technology should be used to replace magnetic ballasts in fluorescent lighting systems for improved efficiency? | 1 | K1 | CO4 |
| (a) Electronic ballasts | | | |
| (b) Halogen ballasts | | | |
| (c) Incandescent ballasts | | | |
| (d) Led ballasts | | | |
| 12. Which technology is recommended for upgrading lighting systems for improved energy efficiency and better light quality? | 1 | K1 | CO4 |
| (a) Led lighting | | | |
| (b) Halogen lighting | | | |
| (c) Incandescent lighting | | | |
| (d) Fluorescent lighting | | | |
| 13. Where are sub-meters typically installed to measure energy consumption at a more granular level within a facility? | 1 | K1 | CO5 |
| (a) Main service entrance | | | |
| (b) Residential homes | | | |
| (c) Individual equipment, departments or tenants | | | |
| (d) Incoming lines of industrial facilities | | | |
| 14. What type of metering technique uses advanced communication technologies to provide real-time data and integration with energy management systems? | 1 | K1 | CO5 |
| (a) Direct metering | | | |
| (b) Indirect metering | | | |
| (c) Sub-metering | | | |
| (d) Smart metering | | | |
| 15. What is the purpose of sub-metering installed at specific areas within a facility? | 1 | K1 | CO5 |
| (a) Detailed monitoring of energy consumption by specific equipment | | | |
| (b) Overview of total energy consumption | | | |
| (c) Tracking utility-supplied power quality | | | |
| (d) Billing and cost allocation | | | |
| 16. Which factor should be considered when choosing a metering location to ensure long-term reliability of the meter? | 1 | K1 | CO5 |
| (a) Load type and characteristics | | | |
| (b) Compliance with regulations | | | |
| (c) Electrical system layout | | | |
| (d) Environmental factors | | | |
| 17. Marginal cost is computed as | 1 | K1 | CO6 |
| (a) Prime cost + All Variable overheads | | | |
| (b) Direct material + Direct labour + Direct Expenses + All variable overheads | | | |
| (c) Total costs – All fixed overheads | | | |
| (d) All of the above | | | |
| 18. Under method of least squares, a linear equation is developed in the form of _____ wherein Y is total cost, a=fixed cost, b= marginal cost and X is output. | 1 | K1 | CO6 |
| (a) $Y=a+bX$ | | | |
| (b) $Y=a-bX$ | | | |
| (c) $Y=a*bX$ | | | |
| (d) None of the above | | | |
| 19. The capital cost of generating equipment, transmission system and distribution system comes under | 1 | K1 | CO6 |
| (a) Fixed capital | | | |
| (b) Running capital | | | |
| (c) Both fixed and running capital | | | |
| (d) All of these | | | |
| 20. The pay period is defined as the ratio of | 1 | K1 | CO6 |
| (a) Net investment to the net annual cash flow | | | |
| (b) Net investment to the capital cost | | | |
| (c) Net annual cash flow to the capital cost | | | |
| (d) Net annual savings to the capital cost | | | |

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

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| 21. Classify the different phases of auditing. | 2 | K2 | CO1 |
| 22. Demonstrate the need of one shot productive measures. | 2 | K2 | CO1 |
| 23. Define Minimum Efficiency. | 2 | K1 | CO2 |
| 24. Outline applications of reactor. | 2 | K2 | CO2 |
| 25. Outline components of cogeneration. | 2 | K2 | CO3 |
| 26. Illustrate the applications of cogeneration. | 2 | K2 | CO3 |
| 27. List out the different ways to save energy on lighting. | 2 | K1 | CO4 |
| 28. How harmonics affect power factor. | 2 | K1 | CO4 |
| 29. Outline the error in instrument transformer. | 2 | K2 | CO5 |
| 30. Outline the economic model of energy. | 2 | K2 | CO6 |

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Illustrate the various equipments required for energy audit. 10 K2 CO1
- OR**
- b) Explain the principle of energy monitoring. 10 K2 CO1
32. a) Explain synchronous machine control and energy management in detail. 10 K2 CO₂
- OR**
- b) Explain the various functions of reactors in energy management. 10 K2 CO₂
33. a) Demonstrate the forms of cogeneration. 10 K2 CO3
- OR**
- b) Explain gas turbine-based cogeneration system with diagram in detail. 10 K2 CO3
34. a) Explain the effect of power factor & harmonics in lightning system. 10 K2 CO4
- OR**
- b) Explain the functions of lightning sources and give a brief account on how optimizing lightning is done. 10 K2 CO4
35. a) Explain about the need of demand meters with respect to Energy management. 10 K2 CO5
- OR**
- b) Explain about the Multitasking solid state meters in Energy Management. 10 K2 CO5
36. a) Explain various demand control techniques. 10 K2 CO6
- OR**
- b) Explain various cost factors involved in metering. 10 K2 CO6