B.Tech DEGREE EXAMINATION, DECEMBER 2023

Sixth Semester

18EEE308T - ENERGY MANAGEMENT SYSTEM AND SCADA

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)
Answer **all** Questions

		Marks	BL	CO

1. Energy Management reduces the load on power plants as _____. — 1 — 1 — 1
   (A) few mega-watt hours of electricity
   (B) few kilo-watt hours of electricity
   (C) few micro-watt hours of electricity
   (D) few pico-watt hours of electricity

2. Which is not the energy management job title? — 1 — 1 — 1
   (A) Utility Energy Manager
   (B) Plant Energy Manager
   (C) Society Energy Manager
   (D) Building Energy Manager

3. Energy Management is a process of _____. — 1 — 2 — 1
   (A) Conserving energy in a building
   (B) Maintain required power
   (C) Maintain balanced voltage
   (D) Reducing reactive power

4. How many pages at the most should an effective energy policy document be ? — 1 — 1 — 1
   (A) 4
   (B) 2
   (C) 10
   (D) 8

5. Highlight the recommended voltage unbalance percentage of a motor in industrial plants. — 1 — 2 — 2
   (A) <7 %
   (B) <5 %
   (C) <3 %
   (D) <8 %

6. The code letter for the range of 8 to 9 locked rotor kVA per horse power in a motor is _____. — 1 — 1 — 2
   (A) H
   (B) L
   (C) K
   (D) A

7. Power factor is the phase relation between _____. — 1 — 2 — 2
   (A) current and power in an AC system
   (B) current and voltage in an AC system
   (C) real and reactive power in an AC system
   (D) voltages at the input and output of an AC system

8. Power supply standards are defined by _____. — 1 — 2 — 2
   (A) National Electrical Manufacturer's Association (NEMA)
   (B) National Energy Manager's Association (NEMA)
   (C) National Electrical Manufacturer's Agency(NEMA)
   (D) National Energy Manager's Agency (NEMA)

9. DDC for EMCS means _____. — 1 — 1 — 3
   (A) Direct Digital Compensation
   (B) Direct Demand Control
   (C) Direct Digital Control
   (D) Direct Demand Compensation

10. Outline the primary objective of EMCS using DDC.   1   2   3
    (A) To optimize the control and sequencing of electrical systems
    (B) To optimize the control and sequencing of mechanical systems
    (C) To optimize the control and sequencing of robust systems
    (D) To optimize the control and sequencing of electronic systems

11. Most economical power factor correction device is _____.   1   2   3
    (A) Potential Transformers
    (B) Inductor Banks
    (C) Capacitor Bank
    (D) Current Transformers

12. EMCS means _____.   1   1   3
    (A) Energy Maintained Current System
    (B) Energy Maintained Control Strategies
    (C) Energy Management Control System
    (D) Energy Major Control Scenario

13. The input/output channels of SCADA based industrial plants range is _____.   1   2   4
    (A) Few 100 to several 1000
    (B) Few 1000 to several 10000
    (C) Few 10 to several 100
    (D) Few 1 to several 10

14. PLC means _____.   1   1   4
    (A) Programmable Level Communicator
    (B) Programmable Level Controller
    (C) Programmable Logic Controller
    (D) Programmable Logic Communicator

15. Which is not the objective of SCADA?   1   2   4
    (A) Data Accquisition
    (B) Control
    (C) Measurement
    (D) Demand Management

16. Evolution of SCADA started in the year _____.   1   1   4
    (A) 1890
    (B) 1860
    (C) 1880
    (D) 1895

17. The system that plays major role in power system automation is _____.   1   2   5
    (A) Measurement System
    (B) Data Acquisition System
    (C) Data Control System
    (D) Data Processing System

18. PNU stands for _____.   1   1   5
    (A) Positive Network Utilities
    (B) Power National Utilities
    (C) Power Network Utilities
    (D) Positive National Utilities

19. Connectivity between SCADA master unit and RTU's in the field is exerted by _____.   1   2   5
    (A) Circuit Breaker
    (B) Fuse
    (C) Communication Network
    (D) Control Relays

20. Which standard is employed for designing substation automation?   1   2   5
    (A) IEC 60601
    (B) IEC 61850
    (C) IEC 60529
    (D) IEC 61005

PART - B (5 × 4 = 20 Marks)
Answer any 5 Questions

Marks   BL   CO

21. Outline any eight roles of an Energy manager.   4   1   1

22. A system has unbalanced voltages of 220 V, 215 V and 210 V. Compute the percentage voltage unbalance in the system.   4   3   2

	Marks	BL	CO
23. List the various amperage values employed in the terminologies of a motor.	4	2	2
24. In hardware configuration of DDC EMCS, the configurations are categorized in what levels? Explain them.	4	3	3
25. Define and list the objectives of SCADA.	4	2	4
26. Highlight the benefits of Power System Automation.	4	2	5
27. What are the roles of an Energy Manager?	4	2	1

PART - C (5 × 12 = 60 Marks)
Answer all Questions

	Marks	BL	CO
28. (a) Explain in detail the organizational structure of Energy Management Program.	12	2	1

(OR)

(b) Highlight on the following planning methods in Energy Management Program.
1. Audit Planning [6 Marks]
2. Educational Planning [6 Marks]

	Marks	BL	CO
29. (a) Outline in detail any twelve glossary of frequently occurring motor terms.	12	2	2

(OR)

(b) Highlight the various torque parameters that could be measured out of speed-torque curves.

	Marks	BL	CO
30. (a) What are the functions that were considered along with related benefits while justifying an EMCS?	12	3	3

(OR)

(b) Explain the EMCS opportunities in a ten floor, multiple tenant and commercial building.

	Marks	BL	CO
31. (a) Explain the SCADA functions in detail with diagram.	12	2	4

(OR)

(b) Explain the following protocols.
1. DNP3 [6 Marks]
2. IEC 60870 [6 Marks]

	Marks	BL	CO
32. (a) Detail on	12	2	5

1. Applications of SCADA [6 Marks]
2. Architecture of Power System Automation [6 Marks]

(OR)

(b) Detail on
1. IEDS [6 Marks]
2. Expected benefits of SCADA [6 Marks]

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