**ERCOT Fundamentals Manual**

**ERCOT System Operator Certification Exam Learning Objectives**

**Section 2 Learning Objectives**

1) Identify the structure and responsibilities of ERCOT as per the Nodal Operating Guides sections 2.0 thru 2.2.

2) Identify the Regional Entity in the ERCOT interconnect and its functions with respect to the NERC Standards as per Nodal Operating Guide section 2.1 and 2.2.

3) Identify the defined Market Participants in ERCOT and their assigned roles (2.3.2)

4) Recall the purpose of the ERCOT Operating Guides.

5) Identify the role of ERCOT’s core processes in its day-to-day operations. (2.4.4)

**Section 13: Transmission Operations**

6) Define transmission system reliability criteria

7) Explain design and operating requirements to conform with reliability criteria

8) Identify procedures and methods of the switching process

9) Recall steps to write proper and safe switching orders

10) Recall communication processes for issuing switching orders

11) List the types of outages

12) Identify the procedure for reporting outages

13) Recall the correct Operator response to various types of outages

**Section 15: Economic Operation**

14) Identify the components of production costs. (15.1)

15) Identify the variables that determine the cost curve of generation. (15.1.20)

16) Recall the relationship of load forecasting and generation commitment/requirements. (15.2, 15.2.1)

17) Identify the types of Generating Capacity. (15.2.2)

18) Define the Scheduling Process (15.2.3)

19) Define Cycling and Transmission Constraints

**Nodal Operating Guides**

**Section 2: System Operations and Control Requirements**

20) Identify the Operational Duties of ERCOT as Described in the relevant sections of the Protocols and North American Electric Reliability Corporation (NERC) Reliability Standards. (2.1)

21) Identify ERCOT’s Resource System Monitoring and Control Requirements, Security Criteria, & Maintenance Requirements. (2.2)

22) Recall ERCOT’s Disturbance and Performance Criteria, along with Compliance requirements. (2.2.8)

23) Identify ERCOT’s response to sustained frequency deviations. (2.2.9.1)

24) Identify ERCOT’s Operating, Regulating, and contingency reserve resource requirements. (2.3)

25) Recall the criteria for removing a constraint from Reliability Unit Commitment as per the ERCOT Nodal Operating Guide section 2.5

26) Identify Requirements for Under-Frequency and Over-Frequency relaying (2.6)

27) Recall Voltage control practices and respective voltage limits. (2.7)

28) Identify Voltage Ride-Through requirements and DC Tie operation (2.8, 2.9)

**Section 3: ERCOT and Market Participant Responsibilities**

29) Identify the specific responsibilities between Qualified Scheduling Entities (QSEs) and Transmission Service Providers (TSPs) to support ERCOT in the security and reliability of the ERCOT System and with respect to Dispatch Instructions as per section 3.1 of the ERCOT Nodal Operating Guides.

30) Define QSE Operating Obligations and identify responsibilities regarding resource status and updates along with Incident and Disturbance reports. (3.2)

31) Identify Operating Obligating of Resource Entities and ensure conformation to applicable NERC reliability standards. (3.3)

32) Recall the responsibilities of the various Market Participants as delineated by Nodal Operating Guide sections 3.2 thru 3.5

33) Recall the Transmission Operator’s role within ERCOT. (NOG 3.7)

34) Recall Sabotage Reporting Requirements as per section 3.8 of the ERCOT Nodal Operating Guides.

**Section 4: Emergency Operation**

35) Recall the ERCOT emergency notification hierarchy as per to Nodal Operating Guides section 4.2/6.9 to include conditions of use for each notification.

36) Recall possible ERCOT actions to be taken in response to an overloaded transmission element as per the Nodal operating Guides section 4.3.

37) Recall ERCOT responsibilities, Market Participant roles, and the processes employed during an Energy Emergency Alert event as per section 4.5 of the ERCOT Nodal Operating Guides.

38) Recall guidelines for ERCOT Blackstart event as per section 4.6 of the ERCOT Nodal Operating Guides.

39) Recall restoration priorities in an ERCOT Blackstart event as per section 4.6.3 of the ERCOT Nodal Operating Guides.

40) Recall responsibilities in a Blackstart event for ERCOT, Blackstart QSE’s, TO’s, and Blackstart Resources as per section 4.6.4 of the ERCOT Nodal Operating Guides.

41) Recall the specifics of the ERCOT Geomagnetic Disturbance Operating Plan as per section 4.7 of the ERCOT Nodal Operating Guides.

42) Recall the conditions of use for Responsive Reserve Service during Scarcity conditions as per section 4.8 of the ERCOT Nodal Operating Guides.

**Section 6: Disturbance Monitoring and System Protection**

43) Recall the rationale for Disturbance Monitoring as per section 6.1.1 (1) of the ERCOT Nodal Operating Guides.

44) Identify the definition of protective relay systems as per section 6.2.1 (1) of the ERCOT Nodal Operating Guides.

45) Recall the voltage levels that the ERCOT Nodal Operating Guides relay design requirements apply to as per 6.2.1.1 (1).

46) Recall Performance Analysis Requirements for protective relay systems as per section 6.2.3 of the ERCOT Nodal Operating Guides.

47) Recall Protective Relay System Failure Response as per section 6.2.4 of the ERCOT Nodal Operating Guides.

48) Recall monitoring and alarm requirements for substation DC as per section 6.2.6.2.3 (7) of the ERCOT Nodal Operating Guides.

49) Recall the requirements for Automatic Under-Frequency Load Shedding Protection Systems as per section 6.2.6.3.5 of the ERCOT Nodal Operating Guides.

**ERCOT Nodal Operating Guides Sect. 7**

50) Recall the functions associated with the ERCOT WAN

**ERCOT Nodal Operating Guide Sect. 11**

51) Recall the function of a Remedial Action Scheme

52) Recall the requirements for Remedial Action Schemes as per ERCOT Nodal Operating Guides section 11.2 (1-3).

53) Recall the purpose of an Automatic Mitigation Plan

54) Recall the definition of a Constraint Management Plan

55) Identify the characteristics and use of Remedial Action Plans as per section 11 of the Nodal Operating Guides

56) Define Pre-Contingency Action Plans and their purpose

57) Recall the purpose and requirements of a Temporary Outage Action Plan as per section 11.7 of the ERCOT Nodal Operating Guides.

**NODAL Protocols Section 2 Definitions and Acronyms**

58) Recall the definitions of the following terms as per the current Nodal Protocols Section 2:

 Adjusted Meter Load

 Capacity Trade

 Distributed Generation

 Distribution Losses

 Dynamic Rating

 Emergency Ramp Rate

 Energy Offer Curve

 Energy Trade

Generic Transmission Constraint

High Emergency Limit

Load Profile

Locational Marginal Price

Low Ancillary Service Limit

Low Emergency Limit

 Low Sustained Limit

 Market Notice

 Peak Load Season

 Shadow Price

 Sub-synchronous Oscillation

 Transmission Element

 Unaccounted for Energy