



**System Operator  
Sample Transmission Certification Examination**

1. What is the minimum notice PJM requires for a nonemergency transmission outage work request?
  - A. 48 hours
  - B. 3 working days
  - C. 5 working days
  - D. 1 week
  
2. An islanded system has a load of 3000 MW. To increase frequency by 1 Hz, how much load should be shed?
  - A. 80 MW
  - B. 180 MW
  - C. 350 MW
  - D. 500 MW
  
3. When thunderstorms are in the vicinity of a critical bulk power transmission facility, the system operator should
  - A. ensure automatic reclosing is in service.
  - B. place bulk power capacitors in service.
  - C. remove bulk power capacitors from service.
  - D. request generators on 500 kV systems bring their VAR output to 0.
  
4. Which of the following actions would be used FIRST to control a reactive transfer limit violation?
  - A. Place reactors in service.
  - B. Load offcost (out of merit) generation.
  - C. Issue load dump warning.
  - D. Modify firm transaction schedules.
  
5. What is the minimum connected load that should be carried per mile of energized 500 kV line during system restoration?
  - A. 10 MW
  - B. 15 MW
  - C. 20 MW
  - D. 25 MW
  
6. When available primary reserve capacity on a system is less than the largest operating generator, or the loss of a transmission facility jeopardizes reliable operations, PJM should issue a

- A. manual load dump warning.
  - B. maximum emergency generation.
  - C. voltage reduction warning.
  - D. primary reserve alert.
7. The maximum allowable voltage on the PJM 500 kV system is
- A. 520 kV.
  - B. 538 kV.
  - C. 550 kV.
  - D. 557 kV.
8. Increased load on a circuit causes lower voltage at the remote end. Which of the following will increase this voltage?
- A. Switch off the distribution circuit capacitors.
  - B. Raise the generation supply.
  - C. Raise the stepdown transformer tap position.
  - D. Switch additional load to this circuit.
9. Which of the following factors are used in forecasting load?
- A. weather forecast, historical load data, and generator availability
  - B. weather forecast, historical load data, and historical weather data
  - C. weather forecast, historical load data, and scheduled outages
  - D. historical load data, historical weather data, and voltage schedules
10. Security analysis constraints/violations should be communicated in a timely manner to the
- A. PJM Scheduler.
  - B. PJM Transmission Operator.
  - C. MAAC Compliance Group.
  - D. NERC Transmission Director.
11. When synchronizing isolated areas, which of the following conditions must be met?
- 1. similar frequency
  - 2. similar voltage
  - 3. matching load
  - 4. minimum phase angle difference
- A. 1, 2, and 3 only
  - B. 1, 2, and 4 only
  - C. 1, 3, and 4 only
  - D. 2, 3, and 4 only
12. A real time security analysis contingency or actual overload is
- A. immediately reported to NERC.
  - B. reported to operations planning.
  - C. bad data.
  - D. immediately communicated to the PJM transmission dispatcher.

13. A 1000 MW generating unit is located in an area with three transmission lines carrying power from the generation source to the customer load. Each line has an emergency limit of 400 MW. The maximum precontingency load that the generator should be allowed to load is
- A. 200 MW.
  - B. 600 MW.
  - C. 800 MW.
  - D. 1000 MW.
14. PJM schedules enough generation to cover internal load, interchange, and
- A. allows all generation in PJM to be scheduled.
  - B. the reserve requirement.
  - C. does not require CT generators to be started.
  - D. produces the lowest possible locational marginal prices.
15. When PJM issues a cold weather alert, local control centers should prepare to report
- A. voltages on an hourly basis.
  - B. the amount of load equipped with under frequency relays.
  - C. a supplemental status report.
  - D. customer interruptions to DOE.
16. The PJM system is operated such that the contingency flow is less than the
- A. warning rating.
  - B. emergency rating.
  - C. load dump rating.
  - D. normal continuous rating.
17. Which of the following are the minimum source requirements for voltage control?
- 1. generation capacity of 30 MW/mile of 500 kV line to be connected
  - 2. 20 MW load/mile of 500 kV line to be connected
  - 3. generation capacity of 20 MW/mile of 500 kV line to be connected
  - 4. 30 MW load/mile of 500 kV line to be connected
- A. 1 and 2 only
  - B. 1 and 4 only
  - C. 2 and 3 only
  - D. 3 and 4 only
18. Distribution factors are used to determine
- A. the distribution of voltage levels on key lines.
  - B. the surge impedance loading of lines.
  - C. the impact of placing capacitor banks in or out of service.
  - D. how the flow of MW on a line will be redistributed upon its loss.
19. Capacitors are most effective

- A. close to the load.
  - B. in absorbing excess VARs.
  - C. at the generating station.
  - D. as dynamic sources of VARs.
20. PJM has issued a heavy load voltage schedule. Which of the following is NOT an appropriate PJM member action in response to this alert?
- A. Ensure that all unit voltage regulators are in service.
  - B. Ensure that all unit voltage regulators are in manual mode.
  - C. Ensure that all reactors are out of service and available capacitors are in service.
  - D. Ensure that all units connected to the 500 kV system are operated so that reasonable MVAR reserve is maintained.
21. Due to EMS/SCADA system problems, a system operator is unable to carry out a PJM request for a 5% voltage reduction. Which of the following is the correct action?
- A. Reduce generating station voltages by 5% in the transmission zone.
  - B. Reduce all EHV station voltages by 5% in the transmission zone.
  - C. Man designated stations to manually reduce distribution voltage by 5%.
  - D. No action is necessary at this time.
22. Which of the following reasons describes why opening a prestudied EHV line has a positive effect in reducing system voltages?
- 1. eliminates the capacitance charging of the line
  - 2. increases MW flow on other EHV lines, thereby reducing their MVAR output
  - 3. eliminates circulating VARs on transformers
  - 4. helps increase reactive import capability
- A. 1 and 2 only
  - B. 1 and 3 only
  - C. 2 and 4 only
  - D. 3 and 4 only
23. When PJM issues a minimum generation alert, company dispatchers should
- A. compile their emergency reducible information and report to PJM via eDART.
  - B. complete their emergency reducible information and notify management.
  - C. call the PJM scheduling coordinator and request full load testing on shutdown CTs.
  - D. request generating station personnel to maintain generator output levels above normal minimums.
24. Which of the following control modes is normally used on PJM systems to develop an ACE when control area to control area tie lines are in service?
- A. flat tie line control
  - B. flat frequency control
  - C. tie line bias control
  - D. area control error
25. When scheduling a planned transmission line outage that spans two companies within the interconnection's control area, the requesting company should

- A. submit an eDART ticket only.
  - B. submit an eDART ticket and then notify the affected company.
  - C. notify and gain agreement of the outage with the affected company, then submit an eDART ticket.
  - D. notify PJM so they can make all necessary arrangements, and submit an eDART ticket.
26. During system restoration, an island requires 400 MW of dynamic reserve. The maximum load allowed with underfrequency relay protection enabled that can be counted as dynamic reserve is
- A. 100 MW.
  - B. 200 MW.
  - C. 300 MW.
  - D. 400 MW.
27. Which of the following types of emergency assistance can be provided by PJM to adjacent control areas provided the adjacent control area has taken the same actions requested of PJM?
- A. manual load dump
  - B. 5% voltage reduction
  - C. invoking load management programs
  - D. voluntary customer load curtailment
28. What is the surge impedance loading on a typical 500 kV line?
- A. 230 MW
  - B. 500 MW
  - C. 750 MW
  - D. 850 MW
29. During system restoration, frequency has decayed for an islanded system to 59.05 Hz and is decaying rapidly. The operator should
- A. notify PJM and seek advice.
  - B. call on additional generation.
  - C. wait for the system to settle out.
  - D. immediately shed load to recover the frequency.
30. If inclement weather postpones the start of a planned outage, the outage will
- A. be postponed indefinitely.
  - B. be rescheduled as unplanned.
  - C. have to be resubmitted the following week.
  - D. retain its status and priority as a planned outage.
31. How long does PJM have to correct a facility that is operating above the 4-hour emergency rating?
- A. 1 minute
  - B. 5 minutes

- C. 10 minutes
  - D. 15 minutes
32. In the event of a heavy load voltage schedule, actions to increase voltage should be taken
- A. prior to the start of the scheduling period.
  - B. prior to most of the load coming in for the operating period.
  - C. after most of the load has come in for the operating period.
  - D. after voltage begins to decrease during the operating period.
33. What one-way communication system is used to disseminate information to local control centers?
- A. all call
  - B. email
  - C. radio
  - D. transaction management system
34. When ordered, a 5% voltage reduction should be taken on
- A. the 230 kV system.
  - B. the 500 kV system.
  - C. the distribution system.
  - D. predetermined tie lines.
35. During initial transmission system restoration, shunt capacitor banks are removed from service to prevent which of the following?
- A. high loads
  - B. low voltage
  - C. high voltage
  - D. low loads
36. The 500 kV system is operated so that on a precontingency basis, all bus voltages are maintained between
- A. 230 to 250 kV.
  - B. 490 to 560 kV.
  - C. 500 to 550 kV.
  - D. 525 to 545 kV.
37. PJM will issue a minimum generation alert when the expected generation level is within what value of normal minimum generation limits for a future period?
- A. 1000 MW
  - B. 1500 MW
  - C. 2000 MW
  - D. 2500 MW
38. If a member detects or suspects actual or attempted sabotage on the bulk power system, they should
- 1. notify PJM immediately.
  - 2. notify SECON immediately.

3. notify DOE within one hour.
  4. notify National Guard within one hour.
- A. 1 and 2 only
  - B. 2 and 4 only
  - C. 1 and 3 only
  - D. 3 and 4 only
39. To avoid cancellation, transmission outages that may result in congestion should be submitted to PJM
- A. 7 days prior to the outage.
  - B. 30 working days prior to the outage.
  - C. by the first day of the week prior to the outage.
  - D. by the first day of the month prior to the outage.
40. Two local control centers (LCCs) interconnect during a system restoration. LCC A has restored 600 MW of load. LCC B has restored 2000 MW of load. Following the interconnection, which of the following statements is true?
- A. LCC A and LCC B both control frequency.
  - B. LCC A and LCC B both control tie line flow.
  - C. Both LCCs control frequency and tie line flow.
  - D. One LCC controls tie line flow and the other LCC controls frequency.
41. During the system restoration process, PJM can be expected to assume frequency control when
- A. all local control centers are interconnected.
  - B. two local control centers are interconnected.
  - C. three local control centers are interconnected.
  - D. the control of an interconnected area is too burdensome for any one local control center.
42. Which of the following are monitored during system restoration?
1. quick start reserves
  2. spinning reserves
  3. operating reserves
  4. dynamic reserves
- A. 1 and 2 only
  - B. 1 and 3 only
  - C. 2 and 3 only
  - D. 2 and 4 only
43. A reactive reserve check (RRC) consists of
- A. spinning and MVAR reserves.
  - B. capacitor MVAR reserve.

- C. spinning, and capacitor MVAR reserves.
  - D. quickstart and capacitor MVAR reserves.
44. Which of the following units would receive first priority in the allocation of cranking power during system restoration?
- A. a large, centrally located steam unit that has been off for a maintenance outage and is considered to be in a cold status
  - B. a large, electrically isolated steam unit that is considered to be in an intermediate status
  - C. a run of river hydro unit located in the central portion of the system
  - D. a large, centrally located steam unit that is considered to be in a hot status
45. An EHV line is loaded above its SIL (surge impedance loading). This line can be considered
- A. a VAR source.
  - B. a VAR load.
  - C. in contingency.
  - D. over its STE (short term emergency rating).
46. The load dump rating of an EHV line is determined by
- A. 105% of the facility's load dump rating.
  - B. 110% of the forecasted ambient temperature.
  - C. 115% of the facility's 4hour emergency rating.
  - D. 120% of the facility's normal rating.
47. Manual Load Dump for capacity shortages is initiated:
- A. Across the entire RTO on a load-ratio share basis
  - B. Only in control zone(s) with a deficient energy position
  - C. Only in the Mid-atlantic region
  - D. Only where it will be effective to unload the transmission line
48. During system restoration, one means of keeping frequency above 59.5 Hz is to activate which of the following?
- A. spinning reserves
  - B. dynamic reserves
  - C. secondary reserves
  - D. shared reserves
49. During system restoration, one means of strengthening and stabilizing an interconnected area is
- A. closing additional tie lines.
  - B. implementing additional transactions.
  - C. implementing emergency procedures.
  - D. loading maximum emergency generation.
50. In cases where a data point ID fails for an extended period of time, the system operator will manually update the value

- A. every 15 minutes.
- B. every 30 minutes.
- C. every hour.
- D. every 4 hours.

11-11-02