2750 Monroe Blvd.
Audubon, PA 19403

Transmission Owner Operator
Sample Transmission Certification Examination

1) 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

2) 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

3) 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

4) 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

5) 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 at the remote end
   c) Raise the stepdown transformer tap position
   d) Switch additional load to this circuit

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6) 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

7) 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

8) 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

9) 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 pre-contingency load that the generator should be allowed to load is:

a) 200 MW
b) 600 MW
c) 800 MW
d) 1000 MW

10) 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

11) 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

12) 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

13) 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

14) 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

15) Which of the following reasons describes why opening a pre-studied 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

16) 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

17) What is the surge impedance loading on a typical 500 kV line?

a) 230 MW
b) 500 MW
c) 750 MW
d) 850 MW

18) 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

19) 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

20) 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

21) 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

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22) 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

23) 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

24) 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

25) 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

26) To avoid cancellation, transmission outages that are less than 5 days in length and 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) Before the first day of the week prior to the outage
d) Before the first day of the month prior to the outage

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27) Two Transmission Owners (TOs) interconnect during a system restoration. TO A has restored 600 MW of load. TO B has restored 2000 MW of load. Following the interconnection, which of the following statements is true?

a) TO A and TO B both control frequency
b) TO A and TO B both control tie line flow
c) Both TOs control frequency and tie line flow
d) One TO controls tie line flow and the other TO controls frequency

28) 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

29) Which of the following are monitored during system restoration?

1. quick start reserves
2. synchronized 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

30) A Reactive Reserve Check (RRC) consists of:

a) Unit, Capacitor/Reactor Leading MVAR reserves
b) Unit, Capacitor/Reactor Lagging MVAR reserve
c) Quickstart, Capacitor/Reactor Lagging MVAR reserves
d) Synchornous, Quickstart and Capacitor/Reactor MVAR reserves

31) 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

32) An EHV line is loaded above its SIL (surge impedence loading). This line can be considered:

a) A VAR source
b) A VAR load
c) A contingency violation
d) Over its STE (short term emergency rating)

33) 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

34) During system restoration, one means of keeping frequency above 59.5 Hz is to activate which of the following?

a) Synchronized reserves
b) Dynamic reserves
c) Secondary reserves
d) Shared reserves

35) 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

36) 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

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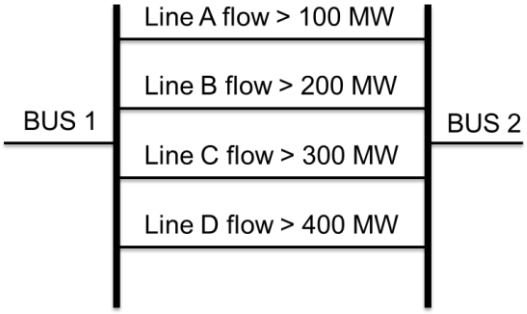
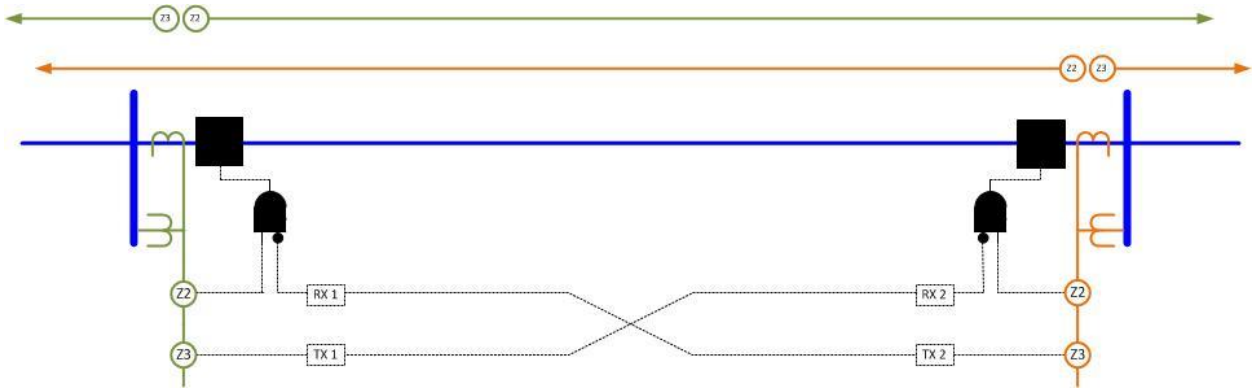
37) For the System shown below, if Line D were to be removed from service what would the new flow be on Line B?

Dfax Table				
	Loss of A	Loss of B	Loss of C	Loss of D
A	0	0.1	0.2	0.25
B	0.1	0	0.3	0.35
C	0.2	3	0	0.4
D	0.7	0.6	5	0



a) 200 MW
b) 340 MW
c) 560 MW
d) 600 MW

38) What type of relay scheme is depicted in the diagram below?



a) Permissive Overreaching Transfer Trip
b) Directional Comparison Blocking
c) Line Differential
d) Stepped Distance Scheme

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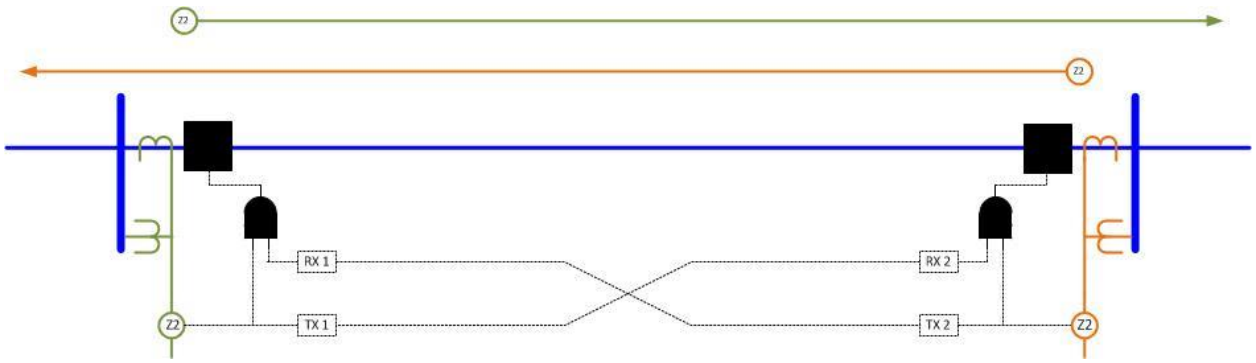

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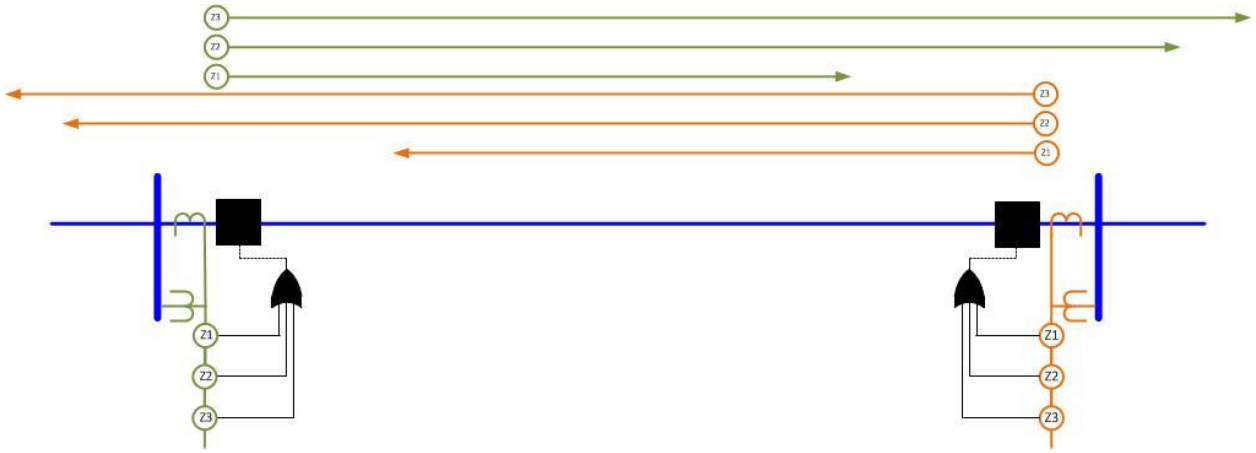

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