

Balancing, Interchange, and Transmission Operator

Certification Examination Content Outline 2012

I. Resource and Demand Balancing (16%)

20 items (Recall - 8, Application - 12, Analysis - 0)

1. Adjust or re-dispatch generation to implement proposed transmission system/equipment outages.
2. Adjust generation and interchange schedules to ensure adequate reserves and regulating margins are maintained.
3. Suspend Automatic Generation Control when required.
4. Dispatch reserves when requested by a member of the Reserve Sharing Group.
5. Inform RC of generation limitation.
6. Take action to ensure dynamic schedules are within prescheduled limits.
7. Take action to minimize inadvertent interchange.
8. Monitor internal loads and adjust generation as needed.
9. Operate Automatic Generation Control (AGC) equipment and validate against all tie line data that affects AGC.
10. Provide notifications of generating unit status following a forced outage.
11. Monitor that AGC and other vital control performance equipment are functioning properly when using back-up data input sources.
12. Monitor the adequacy of resource plans to meet obligations.
13. Monitor AGC to ensure compliance with NERC CPS1 and CPS2 standards.
14. Select proper mode of automatic generation control for system conditions.
15. Manually calculate ACE.
16. Initiate manual control of generation, and maintain scheduled interchange following an AGC system component failure.
17. Adjust both short-term and future forecasts using actual load data and correction factors.

II. Emergency Preparedness and Operations (32%)

40 items (Recall - 8, Application - 8, Analysis - 24)

1. Analyze bulk system disturbances.
2. Analyze forced equipment outages.
3. Take action to permit re-synchronizing and re-connecting to the Interconnection.
4. Coordinate emergency actions with affected systems.
5. Coordinate restoration activities with affected entities.
6. Coordinate the re-synchronization of transmission at preplanned locations.
7. Coordinate voltage reduction as requested or directed.
8. Develop and execute corrective actions when equipment ratings or operating limits are exceeded.

9. Declare a system emergency.
10. Determine the need for manual load shedding to prevent imminent separation from the Interconnection, voltage collapse, or other adverse consequence.
11. Implement a plan for restoring the system to a safe operating condition following a forced outage.
12. Direct actions to return the system to a secure state following a major system disturbance.
13. Request a NERC Energy Emergency Alert.
14. Evaluate requests for emergency removal of equipment.
15. Take action to minimize cascading outages.
16. Take appropriate measures due to loss of control center functionality.
17. Request emergency assistance from neighboring systems for maintaining system reliability.
18. Shed load for system reliability.
19. Report disturbances to NERC and the DOE following established guidelines.
20. Reestablish required operating reserve levels as soon as possible following a contingency that results in operating reserve usage.
21. Respond to system emergencies and frequency deviations to meet local, regional, and NERC DCS requirements.
22. Prepare for a capacity emergency by:
 - a. bringing on all available generation
 - b. postponing equipment maintenance
 - c. scheduling emergency energy purchases
 - d. reducing load
 - e. Initiating voltage reduction
23. Maintain system connectivity to the interconnection to maximize reliability.
24. Take action to protect the system if reliability becomes endangered by remaining interconnected.
25. Report any disturbances or unusual occurrences, suspected or determined to be caused by sabotage to the appropriate systems, governmental agencies, and regulatory bodies.
26. Following a partial or total system shutdown:
 - a. implement the appropriate provisions and procedures of the system's restoration plan in a coordinated manner with adjacent systems
 - b. arrange for start-up and/or emergency power for generation units as required
 - c. arrange for and utilize emergency (backup) telecommunications facilities as required
 - d. restore the integrity of the Interconnection as soon as possible
27. Monitor and periodically test normal and emergency telecommunication systems to ensure that communications are adequate and continuous.
28. Identify and take action when partial or full system islanding occurs
29. Identify and take actions when a partial or full system voltage collapse occurs
30. Following the activation of automatic load shedding schemes:
 - a. restore system load as appropriate for current system conditions and in coordination with adjacent systems

- b. shed additional load manually if there is insufficient generation to support the connected load
 - c. monitor system voltage levels to ensure high voltage conditions do not develop
 - d. monitor system frequency to ensure high frequency conditions do not develop
 - e. monitor the performance of any automatic load restoration relays
 - f. resynchronize transmission at preplanned locations if possible
31. Utilize operating reserves to assist recovery of system frequency.
 32. Obtain resources to restore system frequency.
 33. Formulate a plan to implement corrective actions when an operating reliability limit violation is anticipated.

III. System Operations (20%)

25 items (Recall - 10, Application - 15, Analysis - 0)

1. Analyze generating unit outage requests to ensure system reliability.
2. Analyze transmission facility outage requests to ensure system reliability.
3. Analyze and respond to SCADA inputs (e.g., system voltage, line loading, and system alarms etc.).
4. Communicate planned equipment outages to affected entities and RC's.
5. Communicate forced outages and unusual system events to affected entities and RC's.
6. Comply with RC directives.
7. Coordinate next-day study model changes with RC Area BAs.
8. Coordinate planned transmission and generation outages with all impacted systems for system reliability.
9. Coordinate Reliability must run unit requirements.
10. Coordinate switching with affected systems.
11. Coordinate with adjacent BA on outage of tie line metering.
12. Perform a contingency analysis for next day scheduled outages.
13. Develop a contingency plan responding to equipment outages.
14. Monitor generating unit outputs during normal and abnormal conditions.
15. Develop operating plans based on the results of a contingency analysis.
16. Coordinate future study results for outage coordination.
17. Monitor system conditions to determine actual or potential threats to system reliability.
18. Evaluate the impact of current and forecast weather conditions on system operations.
19. Respond to conditions that may lead to voltage collapse.
20. Initiate hotline calls as appropriate to share reliability information.
21. Maintain constant communications with all affected areas to ensure reliable and secure operation of the bulk electric system.
22. Monitor actual or contingent system operating limit violations and respond as required.
23. Monitor and respond to telecommunication alarms or failures.
24. Monitor Interconnection frequency and investigate causes of unexpected deviations.
25. Re-dispatch generation as directed by the RC.

26. Direct generation re-dispatch to ensure transmission reliability limits are not violated.
27. Provide notifications for computer system hardware and software failure.
28. Respond to light load conditions.
29. Obtain powerflow studies to identify ways to reconfigure the system for real-time and/or Real Time Contingency Analysis (RTCA) violations.
30. Utilize State Estimator results to determine missing or erroneous telemetered data.
31. Obtain contingency case for scheduled outages for next-day operation.
32. Monitor all reliability-related data within a reliability authority area.
33. Direct transmission and generator operators to revise maintenance plans as required, and as permitted by agreements.

IV. Interchange Scheduling and Coordination (10%)

12 items (Recall - 5, Application - 7, Analysis - 0)

1. Calculate inadvertent interchange.
2. Coordinate with adjacent entity as to actual and scheduled interchange values.
3. Perform checkout of daily and hourly scheduled and actual interchange.
4. Enter interchange schedule into the AGC system.
5. Take action to minimize the impact of interchange schedules across constrained interfaces.
6. Monitor tagging system for new, revised, and adjusted interchange transaction.
7. Ensure the accuracy of hourly tie line readings.
8. Manually enter schedule interchange value due to system failure.
9. Manually enter telemetered tie line data due to signal failure with tie point.
10. Monitor ramping capability for requested interchange schedules.
11. Manually calculate net interchange
12. Monitor status of NERC interchange transaction tags to ensure timely approval and implementation.
13. Protect the confidentiality of all interchange transaction information.
14. Curtail tags for reliability.
15. Ensure that the ramp rate, start and end times, energy profile, and losses are communicated to all parties in the transaction.
16. Reestablish curtailed interchange transactions with affected balancing authorities or transmission operators.

V. Transmission Operations (13%)

16 items (Recall - 6, Application - 10, Analysis - 0)

1. Re-configure the transmission system to implement proposed transmission system/equipment outages.
2. Call out system personnel for forced transmission outages.
3. Cancel scheduled transmission work when system conditions require.
4. Control transmission loading by reconfiguring the transmission system.
5. Coordinate the response to forced outages to ensure system reliability.

6. Direct and control transmission switching.
7. Direct the energizing of new facilities.
8. Approve requests for energizing new facilities.
9. Communicate equipment loading issues with Reliability Coordinator.
10. Monitor transmission line loading.
11. Issue and release clearances for work on transmission equipment.
12. Authorize switching on clearances involving critical facilities.
13. Provide notifications of transmission equipment status following a forced outage.
14. Request line loading relief procedures.
15. Direct line loading relief procedures.
16. Adjust transfers across interfaces or paths to maintain system reliability.
17. Perform reliability analysis to determine impact of:
 - a. scheduled outages
 - b. forced outages

VI. Protection and Control (3%)

4 items (*Recall - 1, Application - 1, Analysis - 2*)

1. Analyze the impact of protection equipment outages on system reliability.
2. Ensure special protective systems and remedial action schemes are enabled when needed for system reliability.
3. Maintain adequate protective relaying during all phases of the system restoration.
4. Analyze relay targets, fault locaters and fault recorders to determine a proper restoration plan following a system event.
5. Take action in response to alarms from special protective schemes.
6. Schedule system telecommunications, telemetering, protection, and control equipment outages to ensure system reliability.

VII. Voltage and Reactive (6%)

8 items (*Recall - 3, Application - 5, Analysis - 0*)

1. Approve/deny system voltage regulating equipment outages.
2. Monitor regional reactive reserve availability, including dynamic resources.
3. Monitor and maintain defined voltage profiles/limits to ensure system reliability.
4. Restore dynamic reactive reserves as soon as possible after use.
5. Utilize transmission line removal as a voltage control tool.
6. Monitor the status and availability of generator voltage regulators and/or power system stabilizers, and respond as required to deficiencies that may impact system reliability.
7. Coordinate operation of voltage control equipment with interconnected utilities.
8. Utilize reactive resources from transmission and generator owners to maintain acceptable voltage profiles.