**General Test Procedure**

Attach your test circuit schematic here for reference

Identify all hazardous voltage at each node

Maximum test voltage [V]:

Maximum test current [A]:

Cooling method: *(natural/forced convection, liquid, etc.)*

Anticipated hazard: *(electric shock, fan blade, chemical, liquid leakage, heavy parts, liquid nitrogen, etc.)*

Protection needed: *(bench shield, safety glasses, gloves, etc.)*

Statement:

1. Obey all the general laboratory safety rules.
2. Wear suitable PPE if necessary. Safety glasses must be worn when running experiments unless the bench safety shield is being used.
3. At least two people must be present during the test above 50V.
4. This procedure shall only be used for set-ups operating at less than 600V. Experiments running above 600V are required to have a dedicated test procedure written and submitted to their advisor and the lab manager for review and approval prior to testing.

Setup Construction:

1. Keep the output of power supplies off during any setup construction and modification.
2. Plan ahead before setup modification, discuss with your partner if necessary.
3. Wear proper PPE if necessary. Use proper bench shield and/or safety glasses if test voltage exceeds 50V.
4. Unplug from the mains before moving test equipment (power supplies, oscilloscopes, etc.), and always keep the equipment stable to avoid equipment falling off.
5. Place cables and equipment out of aisles to prevent obstruction and damage.
6. All capacitor banks over 50V should include bleeder resistors. The time for decay to 50V or less should not exceed 1 minute for voltages less than 600V.
7. Check the cooling system: \_\_\_\_\_\_\_\_\_\_\_\_\_ *(coolant or gas connections if used*, *heatsink and fan blades installed correctly without conflict)*.
8. Check all couplers and mechanical connections on rotating equipment, *i.e., motors, generators, flywheels, etc*.
9. Ensure all safety barriers, shields, or covers for all supplies and mechanical equipment is in place and secure.
10. Ground connections must be inspected before the test.
11. Firmly attach any probes on the device under test (DUT). Avoid any possible large ground circulation through passive probes and test equipment.
12. Cross check and double check setup implementation with at least two personnel for test with voltage above 50V. Pay particular attention to all power and control connections to assure they are tight.
13. Locate the fire extinguisher and STOP button in the lab.

Testing:

1. Start-up Procedure:
2. Wear proper \_\_\_\_ (*PPE*: *gloves, glasses, gown, etc.*) and use shields if necessary.
3. Make sure that the testing area is free from unwanted objects, i.e., tools, extra wires, etc.
4. Adjust all high-voltage and high-power sources to zero position.
5. Plug in the test equipment.
6. Attach any probes to the desired positions. Probes may not be moved when power is on.
7. Post proper warning signs, if applicable.
8. No experiments may be run unattended!
9. During normal test:
10. Wear appropriate \_\_\_\_\_\_(*PPE*: *gloves, glasses, gown, etc.*) during testing.
11. Visually monitor the DUT in the testing area. Assure that no personnel approach the setup when the DUT is active.
12. Power on the auxiliary and controller circuitry, if applicable.
13. Turn on any cooling system: \_\_\_\_ *(fan, liquid heat exchanger, or gas systems, etc.)*.
14. Probes may not be moved after this point unless power supplies are off and any storage devices are below 50V.
15. Power on any supplies and adjust to the desired values.
16. Run the experiment and document the performance and results.
17. If an emergency occurs:
18. If there is an immediate, life threating, danger to any personnel in the lab due to gas leaks, electrical hazards, fire, etc., evacuate the lab and push the Red Emergency STOP Button in the laboratory while exiting the lab.
19. In the case of a fire, quickly assess whether it looks like it can be safely extinguished with one fire extinguisher (small fire). Larger fires should be left for the fire department.
20. If small, use a fire extinguisher to extinguish. If larger evacuate the lab, pull the fire alarm and call 911, the fire department. Keep in mind that your safety is the highest priority and you are not required to fight a fire.
21. Do not approach the testing area until the situation is properly assessed.
22. Put on proper PPE prior to accessing the test set-up. This may include insulated voltage or temperature gloves, face shields, etc.
23. Watch for unanticipated hazards in the test set-up, i.e., disconnected wires, irregular shorts or opens, damaged components, leaks, etc.
24. If it is safe to do so, shut-off all the power sources for the set-up.
25. Shut off any cooling water, gas supplies or battery banks.
26. Wait for any storage devices to bleed down to 50V or less.
27. Act according to plans and discussions among personnel. Ask for help from others if necessary.
28. De-energize the capacitors and cable terminals at least twice with proper grounding equipment if possible. Check if all points are below 50V.
29. After all hazards are neutralized, inform all other personnel in the lab that you are about to reset the Red Emergency STOP Button and the main circuit breaker feeding the lab.
30. Normal Shut-down Procedure:
31. Use control commands to stop the operation of DUT.
32. Turn off all power sources, cooling systems, etc.
33. Put on proper \_\_\_\_\_\_\_\_\_\_ (*PPE*: *gloves, glasses, gown, etc.*) prior to changing the test setup.
34. Wait until the residue voltages in all capacitors are below 50V.
35. Check the high-voltage capacitors with multimeter to ensure that the stored energy has been dissipated. De-energize the high-voltage capacitors and cable terminals twice with proper grounding equipment, if necessary.
36. Visually inspect the DUT for any damage or unexpected changes to the setup.
37. Remove the warning signs.
38. Changes to the test setup may now be made.