**ELECTRICAL SAFETY OF PERSONNEL - POSSIBLE QUESTIONS**

1. Describe THREE hazardous conditions that could occur in an installation with a high-prospective short-circuit current level.

2. Danger tags and out-of-service tags are designed to promote safety in the workplace.

State the colours used to identify EACH of the following:

- danger tags

- out-of-service tags

3. Give a brief description of the use of each type of tag, and clearly state how their use differs.

**Danger Tag:**

**Out of Service Tag:**

4. List THREE precautions to be taken when attaching a danger tag to an isolating switch.

5. Detail the precautions relating to the removal of a danger tag.

6. State who may remove a danger tag and under what circumstances.

7. If a person receives an electric shock and the current magnitude is within a certain range, a state known as 'ventricular fibrillation' can occur.

1. Explain the effect of this condition
2. State four factors that affect the severity of electric shock upon the human body

8. Give two circumstances where an isolating switch could carry two safety Tags.

9. (a) You need to take a three-phase, 10 kW pump motor away for repair. You have isolated the motor and

have disconnected the motor cables. The motor cables are still connected to the DOL starter. (ET26)

State TWO precautions which must be taken to ensure the safety of persons and property after you have completed the isolation and disconnection

(b) How is “isolating” a three-phase machine different from just “switching off” the machine?

(c) Describe THREE different methods of safely ensuring the continued isolation of a fixed-wired, three-phase machine.

(d) State the TWO reasons why the prove-test-prove method of testing for isolation is used.

10. (a) The figure below represents a low voltage, three-phase 400V supply to an electrical installation. The installation is live. (ET28)



State THREE hazards that will occur if any one of the three phases and the neutral are transposed at a point between the distribution line and the switchboard.

(b) From the figure in (a) above:

(i) Describe how you would carry out an instrument test to establish whether a phase/neutral transposition has

taken place. Include in your description the type of instrument and equipment used.

(ii) State the expected instrument readings when no transposition has taken place.

11. Note: Read the entire question before commencing. The figure below represents a three-phase electric hot-water cylinder in an industrial plant. It comprises 3 single-phase 2 kW elements controlled by a contactor. The 230V contactor control circuit comprises a coil controlled by the water heater thermostat.

The cylinder is controlled by an adjacent isolating switch (not shown) and is connected via flexible conduit and cables from the contactor. The circuit supplying the cylinder is protected by HRC fuses at the switchboard.



The cylinder is faulty and the isolating switch cannot be operated because the handle is broken. You have been requested to make the necessary repairs to the cylinder and replace the isolating switch. (ET28)

(a) Describe how you would safely isolate the cylinder and its isolating switch so the switch can be replaced and

the cylinder repaired.

(b) The following faults on the cylinder have been reported:

• The fuse to element 1 has blown. When it was replaced, it blew immediately.

• The fuse to element 2 blows at intermittent intervals.

Before you isolated the cylinder you found that:

• The cylinder is still operating on one element.

• No fault exists between the switchboard and the supply side of the isolator.

• The contactor is not faulty.

1. Why does the cylinder operate on one element with two fuses blown?
2. Describe the likely causes of the fault to element 1.
3. Describe the likely causes of the fault to element 2.
4. State the type of test you would carry out to determine the location of the fault on element 1.
5. (v) State the type of test you would carry out to determine the location of the fault on element 2.

12. Note: Read the entire question before answering it. You have completely rewired a three-phase shop that is metered on a remote panel. The work included all final subcircuits including a fixed wired, single phase 2 kW water heater. There was no change to the mains, main earthing system or switchboard.

To complete the work you need to carry out an insulation resistance test of the work you have done and the installation is live. (ET30)

(a) Describe the actions you will take to ensure that the electrical installation is isolated so it is safe to carry out the insulation resistance test.

(b) For the insulation resistance test state:

The type of instrument you will use.

The test voltage – if applicable

(c) Describe how you will carry out the insulation resistance test on the shop. Include in your description the permitted minimum value of any test results.

(d) When you tested the installation the test result was 0.2 M. You proceeded to certify the installation on a Certificate of Compliance as it complied with AS/NZS 3000. Describe the actions and further tests you took to verify that the installation complied with AS/NZS 3000. Include in your description the permitted minimum value of any test results.

13. (a) Danger tags and out-of-service tags are designed to promote safety in the workplace.

1. Give a brief description of circumstances when a Danger Tag is used.
2. Give a brief description of circumstances when an Out-of-Service Tag is used.
3. List THREE precautions to be taken when attaching a danger tag to an isolating switch.

(b) Explain the difference between:

A 10 kW pump motor that has been “isolated”. and

A 10 kW pump motor that has been “switched off”.

(c) Describe how the prove-test-prove method of testing is carried out.

(d) You are using the prove-test prove method at the supply side of a threephase main switch to see if the switchboard is isolated. What tests would you make to clearly establish that isolation (or otherwise) has taken place.