

## City & Guilds 2395 – Written Exam (No2).

**Section A** -All questions carry equal marks. Answer **all three** questions.

Show **all** calculations.

- 1 A periodic inspection is to be carried out on an electrical installation forming part of a TN-C- S system in a 30 year old dwelling.
  - a) State **five** further inspection items to be confirmed and recorded relating to the earthing and bonding arrangements.

(5 marks)
  - b) State **ten** items to be verified and recorded during the inspection of the Distribution Board, before & after the cover is removed.

(10 marks)
  
- 2 An electrical installation in a light-Industrial premises is scheduled for a further periodic inspection and test after a five year lapse of time, for insurance purposes.
  - a) List the **three** documents to be completed and submitted to the client on completion of the periodic inspection and test.

(3 Marks)
  - b) State the action to be taken by the inspector before the inspection and test can be undertaken regarding the previous documents, circuit charts and test results for the installation.

(2 Marks)
  - c) Describe the Safe Isolation procedure for a three phase isolator controlling a sub-main distribution board, once permission to isolate has been given.

(10 marks)
  
3. A single 2 metre earth electrode is being utilised for the earthing to a generator providing an alternative source of supply to a 5 storey lift in a small medical centre. A test is to be carried out to establish the resistance of this electrode. Describe in detail, with the aid of a fully labelled diagram, how this test would be carried out.

(10 Marks)

**Section B-** All questions carry equal marks. Answer **all three** questions.

Show **all** calculations.

Questions 4 to 6 all refer to the enclosed scenario, see source document. Ensure you read this scenario before attempting these questions. Answers you provide must reflect the detail and information given in the scenario.

- 4
- a) List **three** supply parameters which can be obtained by enquiry, & which an inspector needs to record on the main documentation issued following the periodic inspection and test. (3 marks)
- b) Explain in this case why it would be acceptable for the Test Engineer to carry out a 'sample' inspection as highlighted in GN3, and test only a percentage of this installation. (4 marks)
- c) Explain which test could be omitted from the extent of the inspection and test, and why. (3 marks)
- d) List **five** items to be recorded & substantiated during the inspection of the intake position & the LSA equipment. (5 marks)
- 5 The continuity of main protective bonding conductors is to be confirmed.
- a) List the **two** methods which can be used to confirm continuity of main protective bonding conductors. (2 marks)
- b) Explain each part of the equation  $Z_s = Z_e + (R_1 + R_2)$ . (4 marks)
- c) At which point on a circuit is the  $Z_s$  reading normally taken (1 mark)
- d) Explain why a main protective bonding conductor is disconnected at one end prior to testing for continuity of protective bonding. (6 marks)
- e) Determine, showing all calculations, what the expected reading for the main bonding would be if the 10mm bonding cable had a resistance of  $1.8 \text{ m}\Omega/\text{m}$  at  $20^\circ\text{C}$  & the main protective bonding conductor is 26m long. (3 marks)
- 6 Describe in detail & with the aid of a diagram, how to test the Earth Fault Loop impedance to the AC unit (circuits R/Y/B - 4). (15 marks)

**NOW GO BACK AND CHECK YOUR WORK.**

## SCENARIO (SECTION B-QUESTIONS 4 TO 6)

The electrical installation in a 12 year old serviced office building which requires inspecting & testing prior to a new tenant taking over occupancy of the premises. The current Tennant is still present in the offices, & will be working within the building until the new tenant takes over the lease.

All circuits are installed using thermoplastic 70°C insulated and sheathed PVC/PVC singles, having copper conductors & enclosed in steel conduit drops from metal trunking, and run within metal trunking in the ceiling voids.

The supply and installation form part of a three-phase 400/230 V TN-S system having a  $Z_e$  and PFC of 0.11  $\Omega$  and 3.72 kA respectively.

There is no evidence of any alternations, although an AC unit may have been added after the initial installation. The certification from the initial verification of the original installation and suitable circuit charts are available to the inspector.

Metallic water & gas pipework, as well as structural steelwork are evident, and 10mm<sup>2</sup> main protective bonding conductors are present within the fabric of the building. All testing will be carried out at a temperature of 20°C.

Figure 1 shows information taken from the circuit schedule which is in the door of the TP-N metal-clad distribution board containing Type B, BS EN 60898 circuit breakers and BS EN 61009 RCBOs.

**\*indicates RCBO**

Circuit No.	Device Rating	Description	Conductor csa in mm <sup>2</sup>	
			Live	cpc
R1	20 A	Radial circuit for socket-outlets Office 1	2.5	1.5
Y1	32 A*	Ring final circuit 1 for socket-outlets throughout offices	2.5	1.5
B1	32 A*	Ring final circuit 2 for socket-outlets throughout offices	2.5	1.5
R2	16 A	Boiler	2.5	1.5
Y2	10 A	Lights Office 1	2.5	1.5
B2	10 A	Lights Office 2	2.5	1.5
R3	6 A	Lights Office 3	1.5	1.0
Y3	6 A	Lights Office 4	1.5	1.0
B3	16A	Water Heater	2.5	1.5
R4	32A	AC Unit - Three Phase	6.0	4.0
Y4	32A		6.0	4.0
B4	32A		6.0	4.0

