Inspection & Testing Scenario

A small, 10-year old commercial/office premises at 27 Old Street, Littleton has been sold and the new owner/occupier, Mr A.N.Other, has requested an electrical inspection and test for insurance purposes. The installation has remained unaltered since new but the original certificates/documents have been mislaid.

The supply system is single phase, 2-wire, 230v 50Hz, TN-C-S with measured values for PFC and Ze of 3000A and 0.08Ω respectively.

The suppliers' protective device is a 100A BS1361 fuse and the copper, earthing and main equipotential bonding conductors (16mm^2 & 10mm^2) respectively, have been correctly connected. The other services to the premises are gas and water.

The main 230v/100A 2-pole switch is incorporated in a six-way split load distribution board incorporating a 63A/30mA RCD. This unit is fully accessible and located in the entrance lobby.

The installation comprises 3 x 32A 4.0mm^2 radial socket outlet circuits (Circuits 1 & 2 are RCD protected) serving 9, 11 and 14 sockets respectively, a 16A 2.5mm^2 radial water heater circuit and 2 x 6A 1.0mm^2 lighting circuits (circuit 5 supplies 9 interior lights and an exterior PIR controlled luminaire, circuit 6 supplies 7 Cat 2 Type Modular fittings). All are wired in thermoplastic (pvc) conduit (cpc's same size as phases). All protective devices are 'Type B' BSEN60898 (M6) miniature circuit breakers.

Circuit lengths are recorded as:

1: 17m
2: 28m
3: 12m
4: 37m
5: 25m
6: 17m

The client requests that radial s/o circuit 3 should not be isolated for testing, as it feeds important IT equipment.

The only installation fault revealed during the inspection process was the omission of appropriate sleeving on lighting switch conductors and two-way lighting strappers.

Live Polarity has been proven to be correct for all circuits, and all functional tests were satisfactory.

The test instrument used was a 4 in 1 multi-function tester serial number ABB 176.

Q1. Complete a copy of the Schedule of Inspection in BS7671indicating only those items that are relevant to this installation.

Q2. State:

a. **What would be seen as a value of Zs that may be deemed suspect for any given circuit, indicating why and giving a possible reason if this were the case.**
b. **Why it may not have been possible to obtain values for Zs for circuits 1 & 2.**
c. **How the situation in (b) may be overcome.**

Q3. a) If an insulation resistance test on the whole circuit had not been possible, although the overall value between live conductors were recorded at greater than 200MΩ, and individual values between live conductors and earth were recorded to be

9MΩ , 1.2MΩ, 1.4MΩ, 29MΩ and >200MΩ, calculate the theoretical value of Insulation Resistance at the intake position between phase to earth from the information offered above. Show all calc's.

b) Would the overall reading calculated in (a) be acceptable, and if not why.

Q4. Explain why

- **a. A 30mA RCD has been used on circuits 1 & 2 rather than one of a higher $I_{\Delta n}$ value.**
- **b. If the installed RCD is suitable.**

Q5. Complete a copy of the schedule of circuit details from BS7671 for the installation based on the information provided.

Q6. Using either the OSG or GN3 Tables,

a) What would be the expected R1+ R2 value for circuits 1, 4 & 6?

b) What would the expected Zs be for circuit 2?

Show all calcs.