**Assessment Test for Applicants for an Electrician's Licence1**

Applicants for an electrician's licence are required to attend a written assessment test and an interview. The list of typical technical questions that the applicants would be assessed on is appended below for reference. It is to be noted that the list of technical questions is non-exhaustive. The applicants will have to acquire the knowledge and experience relevant to the electrical work which an electrician is authorised to perform.

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1 Disclaimer

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List of Typical Technical Questions That Applicants for An Electrician's Licence Would Be Assessed On

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| | **General Requirements** |
| 1 | What is the nominal voltage and frequency and the respective percentage variations of low voltage electricity supply in Singapore? |
| 2 | Describe the procedure and safety precaution to be taken to conduct tests on a residual current circuit breaker having a 30mA sensitivity in a residential premises. |
| 3 | What is the required tripping current and tripping time of a residual current circuit breaker (RCCB) for use in a domestic electrical installation? |
| 4 | Describe the procedure and safety precaution to be taken to conduct insulation resistance tests on an electrical switchboard / DB with the circuits connected. What is the required minimum insulation resistance value for a new switchboard under SS 638? |
| 5 | Describe the procedure to conduct earth resistance test for a new electrical installation before connecting to grid supply. |
| 6 | Describe the procedure and safety precaution to be taken to carry out troubleshooting when the insulation resistance values measured between the Neutral terminal and the Earth terminal at a consumer unit are below one Mega Ohm. |
| 7 | What is the minimum acceptable insulation resistance value of an existing electrical installation? |
| 8 | Describe the procedure and safety precaution to be taken to conduct continuity test on an electrical circuit in an electrical installation. |
| 9 | Describe the steps involved in conducting tests on a ring circuit for switched socket-outlets. |
| 10 | What is the purpose of conducting polarity test on a final circuit in an electrical installation? Describe the steps in conducting such test for a lighting circuit and a switched socket-outlet circuit including the instruments and tools to be used. |
| 11 | What is the disadvantage(s) of using a checker-plug? |
| 12 | What is the difference between a type C and a type D miniature circuit breaker? |
| 13 | Describe the procedure and safety precaution to be taken to conduct phase rotation test on an electrical installation. If the incoming service cable from the building's tap-off point is found to be in wrong polarity, what should be done next before you change the connection of the incoming service cable? |
| 14 | What are the acceptable types of the earthing system for a permanent electrical installation? Illustrate their differences with a diagram. |
| 15 | What is the type of the earthing system to be used for an electrical installation to take electricity supply directly from the low voltage grid network? |
| 16 | How do you carry out the earth resistance test? |

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| 17 | How do you determine the setting of an earth leakage relay of a 60- Amp 400Va.c. main switchboard during the turn-on of an electrical installation if the electricity supply of the electrical installation is drawn from SP PowerGrid's low voltage distribution network? |
| 18 | Describe the procedure and safety precaution to be taken to conduct earth fault loop impedance test on a new electrical installation after turn-on of electricity supply. |
| 19 | What is the minimum height for installing a switched socket-outlet above floor level or working surface? |
| 20 | What is the minimum distance away from the edge of a swimming pool for installing a switched socket-outlet? |
| 21 | Describe the requirements for installing an electronic lighting switch. |
| 22 | What can you do to improve the earthing system if you are unable to obtain the required earth resistance value? |
| 23 | What safety measures you must take before you start to troubleshoot a faulty electrical equipment? |
| 24 | Describe the procedure of conducting an electrical installation testing for a typical landed domestic premises. |
| 25 | Where should be the appropriate location of the main equipotential bonding for water pipe and gas pipe in a semi-detached house? |
| 26 | What is a Permit-To-Work issued by a Licensed Electrical Engineer taking charge of a high voltage electrical installation? |
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| | **Electrical Installation Design** |
| 27 | Draw a single-line drawing showing the essential devices to be provided in a 60-Amp 3-phase main intake switch board and DB (if any) for the electrical installation of a 2-storey semi-detached house with 7 lighting circuits, 6 switched socket-outlet circuits, 2 Nos of electric water heater (each 3kW), 1 No. of electric cooker (3kW) and 2 Nos of split air-conditioners each with 2 fan coil units. |
| 28 | What is the type of earthing system to be used for a supply installation where electricity supply is taken from a mobile generator? Show in a diagram the various parts of the generator to be earthed and the earthing arrangement. |
| 29 | What are the requirements and allowable methods for installing concealed wiring at a depth of less than 50 mm from the surface of the wall? |
| 30 | What are the allowable operating voltages for decorative lighting circuits? What is the safety requirement if low voltage is used for decorative lighting installed on overhead poles in a public place? |
| 31 | What is the requirement for decorative lights accessible to the public on kids-ride amusement machines according to the code of practice? |
| 32 | What is the design requirement for providing Separated Extra Low Voltage electricity supply to kids-ride equipment? |
| 33 | What colour shall be used for an electrical conduit to distinguish it from conduits/pipes used for other services? |

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| 34 | What would be your design for installing a general purpose 13A twin switched socket-outlet in a bathroom? What are the requirements you will specify in your design? |
| 35 | What is the rating of the circuit breaker controlling a 15A switched socket-outlet (SSO)? |
| 36 | What is the maximum number of 13A SSO allowable in a final circuit with a 16A mcb in a domestic electrical installation? |
| 37 | What is the permitted height for a switchboard or distribution board? |
| 38 | What is the design consideration in sizing a final circuit in an electrical installation? |
| 39 | List the factors that need to be taken into consideration in determining the current carrying capacity of a PVC cable? |
| 40 | Design a final circuit for an electric water heater rated at 3kW showing the circuit components and their ratings. |
| 41 | Draw a single-line drawing showing the arrangement of protective devices before and after a whole-current kWh meter. |
| 42 | Can final circuits to be supplied from different phases of a 3-phase electrical installation be installed in the same trunking/conduit/PVC casing? |
| 43 | List the measuring instruments that you need for electrical work and their purposes. |
| 44 | What is the acceptable distance between a switch/switched socket-outlet from a water pipe joint? |
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| | **Temporary electrical installations for building and construction worksites** |
| 45 | What is a socket-outlet assembly (SOA)? How should it be used at a worksite? |
| 46 | What are the essential protection requirements to be incorporated in a SOA? |
| 47 | What should be covered in daily inspections of an electrical installation for mini-fair or trade fair? |
| 48 | State the allowable number of single-phase industrial socket-outlets in a SOA receiving electricity supply from a three-phase 32-Amp switchboard/distribution board. |
| 49 | State the respective allowable numbers of three phase industrial socket-outlets and single phase industrial socket-outlets in a SOA receiving electricity supply from a three phase 32-Amp switchboard/ distribution board. |
| 50 | State the allowable number of single-phase industrial socket-outlets in a SOA receiving electricity supply from a three-phase 63-Amp switchboard/distribution board. |
| 51 | State the respective allowable numbers of three-phase industrial socket-outlets and single-phase industrial socket-outlets in a SOA receiving electricity supply from a three-phase 63-Amp switchboard/distribution board. |
| 52 | What is the earthing requirement for a three-phase generator to be used for construction site, trade-fair, mini-fair or exhibition site? |

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| 53 | Can 13A switched socket-outlets be installed in a construction worksite for providing electricity supply to hand tools? |
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| | **Cable colour code** |
| 54 | Describe the new cable colour code to be used for an electrical installation receiving single-phase supply |
| 55 | Describe the new cable colour code to be used for an electrical installation receiving three-phase supply |
| 56 | For a new electrical installation with 3-phase circuits, can three brown-coloured single-core PVC insulated cables be used for the line conductors, namely: L1, L2 & L3? State the additional requirement, if any. |
| 57 | For a new electrical installation with 3-phase circuits, can three blue-coloured single-core PVC insulated cables be used for the line conductors, namely: L1, L2 & L3? State the additional requirement, if any. |
| 58 | What colour markings are required for single-core XLPE-insulated/ PVC-sheathed cables (usually in black colour) to be used in three-phase circuits under the new cable colour code? |
| 59 | What should be done if a new switchboard is installed with red- yellow and blue- coloured lamps for the incoming and outgoing supply indicators? |
| 60 | Under the new cable colour code, what would be the method for replacing a damaged single-core black-coloured PVC-insulated neutral cable of an existing three-phase circuit installed 15 years ago? |
| 61 | Under the new cable colour code, what would be the method for replacing a damaged single-core PVC-insulated blue-coloured cable of an existing three-phase circuit installed 10 years ago? |
| 62 | Can a PVC-insulated single-core cable with green & yellow-coloured combination be used as a phase or neutral conductor? Why? |
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| | **Domestic and Industrial Applications** |
| 63 | For a 3-phase 400V 2 kW motor with power factor of 0.8:<br>a. What is the running current?<br>b. What is the starting current based on direct-on-line starting arrangement?<br>c. Should the cable be sized to carry starting current or running current? |
| 64 | What is the reason that d.c. welding sets, instead of a.c. welding sets, shall be used as far as practicable for general welding works? |
| 65 | What is continuous rating and standby rating of a standby generator? |
| 66 | A 3-phase circuit consisting of 4 Nos of 16mm2 PVC single core cables installed in conduit is designed to carry a load current, Ib of 45 A. Assuming the current carrying capacity of the PVC cables installed in conduit is Iz = 68A, and the circuit is protected by a 50-A MCB. Is the protection against overloading for this circuit adequate? |

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| 67 | A battery charger is installed in a switchroom for supplying the protection system of a main switchboard consisting of six 22kV switchgear panels. You are required to install a 13A switched socket-outlet for the battery charger from the distribution board which has a 30mA RCCB. You are asked to bypass the RCCB for the 13A switched socket-outlet circuit. What is the reason for bypassing the RCCB? |
| 68 | Your client asked you to install a splash-proof 13-A switched socket-outlet in a shower room. As a Licensed Electrician, would you install the switched socket-outlet as requested? Why? |
| 69 | In your inspection of the electrical installation in a new apartment, you found that a 3kW electric water heater installed in the bathroom is connected to a 13 A switched socket-outlet. What is your comment on the arrangement? |
| 70 | Why is there a need to bond the hot water copper pipe of an electric water heater in a bathroom to earth? What is the minimum size of copper conductor to be used for the earth bonding? |
| 71 | Draw a single-line diagram to show the protective devices of a typical HDB consumer unit receiving 40A 230Va.c. electricity supply. |
| 72 | What is the purpose of the energy lockout / tagout procedure? Give one example to illustrate how you would apply the procedure. |
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| | **Regulations** |
| 73 | What is the difference between an electrical installation and a supply installation? |
| 74 | What types of electrical installations with an approved load of 45kVA will require an electrical installation licence before connection of electricity supply? |
| 75 | What types of supply installations with an approved load of 45kVA will require a supply installation licence before connection of electricity supply? |
| 76 | What are the types of electrical installations that require testing by SP Services prior to turn-on of electricity? |
| 77 | Name the three mandatory Singapore Standard codes of practice for compliance as stated in the Regulations. |
| 78 | What is the authorisation conferred to the holder of an electrician's licence? |
| 79 | Name the classes of licensed electrical workers and state briefly the respective authorisation conferred to them. |
| 80 | What is the minimum frequency of regular inspections that a licensed electrical worker is required to carry out on a temporary electrical installation at construction site? |
| 81 | What is the minimum frequency of regular inspections that a licensed electrical worker is required to carry out on a temporary electrical installation at trade fair, mini-fair or exhibition site? |
| 82 | Do you require a supply installation licence to operate a standby generator installed in domestic premises? |

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| 83 | State the regulatory and safety requirements to be complied with prior to turn-on of electricity to a new supply installation for a construction site? |
| 84 | What is the purpose of “Certificate of Compliance”? When should it be issued and who should sign the Certificate of Compliance? |
| 85 | What is the purpose of “Statement of Turn On”? When should it be issued and who should sign the statement? |
| 86 | How do you know that an electrical article complies with the Safety Mark Scheme? Name three such articles. |
| 87 | After installing the final circuits for 2 new lighting points and 5 new switched socket-outlets in an existing domestic electrical installation, what should the licensed electrician do before he turns on electricity supply to these final circuits? |
| 88 | Can single-core PVC-insulated aluminium cables be used for an electrical installation in a domestic premises? |
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## Typical Practical Test (for electrician applicants)

Applicants will be tested in an electrical installation mock-up not exceeding 45 kVA. They are required to demonstrate the ability to identify:

- non-compliance to code of practices
- troubleshoot common electrical faults. This include:

a) New cable colour code;
b) Wrong circuit / colour code labelling;
c) Open circuit;
d) Short circuit;
e) Wrong phasing;
f) Wrong polarity.