



8202-520 MARCH 2022

Level 2 Technical Certificate in Electrical Installation

Level 2 Electrical Installation – Theory exam

Wednesday 30 March 2022
09:30 – 11:30

You should have the following for this examination

- a multiple-choice answer sheet
- a pen with black or blue ink
- a non-programmable calculator

Permitted reference materials:

- BS 7671
- IET On-site Guide

This question paper is the property of the City and Guilds of London Institute and is to be returned after the examination.

Read the following notes before you answer any questions

- You **must** use a pen with black or blue ink to complete **all** parts of the answer sheet.
- Check that you have the correct answer sheet for the examination.
- Check that your name and candidate details are printed correctly at the top of your answer sheet.
- Inform the invigilator if your name or examination details are not correct.
- Each question shows **four** possible answers (lettered 'a', 'b', 'c' and 'd'); only **one** is correct.
- Decide which **one** is correct and mark your answer on the **answer sheet** with your pen.

For example if you decide 'a' is correct, mark your answer like this

101	<input checked="" type="radio"/>	<input type="radio"/> (b)	<input type="radio"/> (c)	<input type="radio"/> (d)
	Cancel	Cancel	Cancel	Cancel

If you want to change your answer, cancel your first choice by filling in the 'cancel' box below the circle like this

101	<input checked="" type="radio"/>	<input type="radio"/> (b)	<input type="radio"/> (c)	<input type="radio"/> (d)
	Cancel	Cancel	Cancel	

Then mark the answer which you have now decided is correct. For example if you now decide 'c' is correct, mark your answer like this

101	<input checked="" type="radio"/>	<input type="radio"/> (b)	<input checked="" type="radio"/>	<input type="radio"/> (d)
	Cancel	Cancel	Cancel	

Any other marks on the form may invalidate some of your answers.

- Any calculations or rough working can be done on the question paper.
- Attempt all questions. If you find a question difficult, leave it and return to it later.

This paper contains 60 questions. Answer them using the 'boxes' numbered 1 to 60 on the answer sheet.

- 1 Which Regulations are non-statutory?
- The Electricity at Work Regulations.
 - Requirements for Electrical Installations BS 7671.
 - Control of Substances Hazardous to Health (COSHH) Regulations.
 - Control of Noise at Work Regulations.
- 2 Which may become a land pollutant if not contained safely?
- Mercury.
 - Argon.
 - Neon.
 - Nitrogen.
- 3 Which type of fire extinguisher would have a **red** band?
- CO₂.
 - Foam.
 - Water.
 - Powder.
- 4 Who is responsible for organising construction work on a building site?
- Site Manager.
 - Clerk of Works.
 - Quality Inspector.
 - Principle Architect.
- 5 What colour sign would tell you a safety helmet must be worn on a construction site?
- Yellow and black.
 - Green and white.
 - Red and black.
 - Blue and white.
- 6 What unit is equivalent to $A \times 10^{-3}$?
- nA.
 - μ A.
 - mA.
 - kA.
- 7 What is the diameter of a conductor with a cross sectional area of 6 mm^2 ?
- 1.27 mm.
 - 1.38 mm.
 - 2.24 mm.
 - 2.76 mm.
- 8 Which is the correct transposition of $X_L = 2\pi fL$?
- $f = \frac{2\pi L}{X_L}$
 - $f = \frac{X_L}{2\pi L}$
 - $f = \frac{2\pi X_L}{L}$
 - $f = \frac{\pi L}{2X_L}$
- 9 What is measured in m^2 ?
- Area.
 - Length.
 - Width.
 - Volume.
- 10 How many degrees does a generator rotor rotate per cycle?
- 45°.
 - 90°.
 - 180°.
 - 360°.
- 11 What is the SI unit of measurement for resistance?
- Ohm.
 - Watt.
 - Henry.
 - Farad.
- 12 Which is a good conductor of electricity?
- Mica.
 - Nylon.
 - Carbon.
 - Ceramic.
- 13 Which instrument is used to **directly** measure electrical current?
- Voltmeter.
 - Ammeter.
 - Ohmmeter.
 - Wattmeter.
- 14 What is the resistance of a 65 m 1.5 mm^2 copper conductor where its resistivity is $0.0172 \mu\Omega\text{m}$?
- 0.63 Ω
 - 0.65 Ω
 - 0.75 Ω
 - 0.94 Ω

- 15 Three resistors of $17\ \Omega$, $44\ \Omega$ and $66\ \Omega$ are connected in parallel.

What is the total circuit resistance?

- a $0.09\ \Omega$
- b $10.34\ \Omega$
- c $42.33\ \Omega$
- d $127.0\ \Omega$

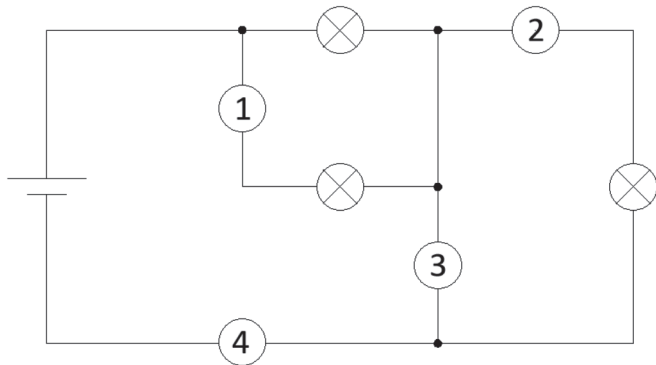


Figure 1

- 16 An ammeter is to be installed in the circuit shown in **Figure 1**.

At which point in the circuit must this be installed in order to measure the **total** load current?

- a 1.
- b 2.
- c 3.
- d 4.

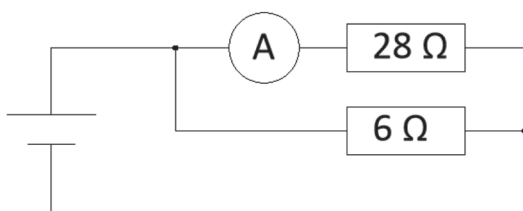


Figure 2

- 17 What is the total current in the circuit in **Figure 2** if the ammeter reads 8 Amps?

- a 6.6 A.
- b 10.2 A.
- c 37.3 A.
- d 45.3 A.

- 18 What is the SI unit of measurement for capacitance?

- a Ampere.
- b Farad.
- c Henry.
- d Webber.

- 19 What is the unit of magnetic flux?

- a Watt.
- b Tesla.
- c Weber.
- d Coulomb.

- 20 Which electrical item would **most** commonly contain a permanent magnet?

- a Float switch in a water tank.
- b Dimmer switch on a lighting circuit.
- c Shower isolator in a bathroom.
- d Security contact on a door.

- 21 What does the thumb in Fleming's Right Hand Rule represent the direction of?

- a Field.
- b Motion.
- c Current.
- d Resistance.

- 22 What force would be created by a current of 9.15 A flowing through 1800 mm of conductor with a flux density of 0.35 T?

- a 1.78 N.
- b 5.76 N.
- c 47.0 N.
- d 5764.5 N.

- 23 What is the formula used to calculate the RMS voltage on a 50 Hz sine wave?

- a $V = \frac{Peak}{2}$
- b $V = \frac{Peak}{\sqrt{2}}$
- c $V = \frac{1}{2 \times Peak}$
- d $V = \frac{1}{\sqrt{2} \times Peak}$



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Figure 3

24 What is the **output** voltage of the transformer shown in **Figure 3** which is commonly used on construction sites?

- a 12 V.
- b 24 V.
- c 110 V.
- d 230 V.

25 A transformer has 239 primary and 29 secondary turns and has a secondary voltage of 400 V.

What value is the input voltage?

- a 1100 V.
- b 3300 V.
- c 11000 V.
- d 33000 V.

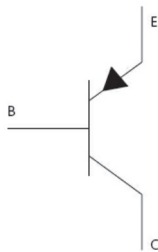


Figure 4

26 Which electronic component is shown in **Figure 4**?

- a Transistor.
- b Thermistor.
- c Triac.
- d Diac.

27 Which component can be made by connecting four diodes?

- a Amplifier.
- b Capacitor.
- c Bridge rectifier.
- d Autotransformer.

28 Which is the **most** appropriate tool to cut into a plasterboard wall to insert a socket-outlet backbox?

- a Pad saw.
- b Panel saw.
- c Tenon saw.
- d Junior hacksaw.

29 Which type of conduit may be affected by UV rays from direct sunlight?

- a White rigid PVC.
- b Black rigid PVC.
- c Stainless steel.
- d Galvanised steel.

30 Which risk may be caused by leaving burrs within metallic conduit?

- a Increase of corrosion.
- b Increase of eddy currents.
- c Damage to cable insulation.
- d Reduced mechanical strength.

31 What type of cable support system would a crampet be used to secure in place?

- a Tray.
- b Ladder.
- c Conduit.
- d Trunking.

32 What is the **minimum** distance between cleats supporting an accessible horizontal steel wire armoured cable with an overall diameter of 12 mm?

- a 350 mm.
- b 400 mm.
- c 450 mm.
- d 550 mm.

33 What is the **minimum** number of bends required to be made to produce a bubble-set in straight conduit?

- a 1.
- b 2.
- c 3.
- d 4.

34 Which cable insulation material must not be used in direct contact with expanded polystyrene?

- a PVC.
- b XLPE.
- c Glass.
- d Rubber.

35 Which type of circuit would be **most** likely to contain an intermediate switch?

- a Shower.
- b Lighting.
- c Cooker.
- d Alarm.

36 What is the **maximum** number of 4 mm² single-core conductors that can be installed in one straight 3 m length of 20 mm galvanised conduit?

- a 6.
- b 7.
- c 8.
- d 9.

37 Which of the following would be the **best** PVC conduit temperature to assist the process of making a 90° bend?

- a 0 °C
- b 10 °C
- c 60 °C
- d 200 °C



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Figure 5

38 What type of fixing is shown in **Figure 5**?

- a Anchor bolt.
- b Channel nut.
- c Masonry bolt.
- d Spring toggle.

39 What is the purpose of a catenary wire?

- a Drawing in cables into conduit.
- b Providing an earth connection.
- c Supporting overhead conductors.
- d Connecting a computer system.



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Figure 6

40 Which type of cable would **commonly** use the type of connector shown in **Figure 6**?

- a CAT 5.
- b Coaxial.
- c Single-core.
- d Twin and cpc.

41 What is the **maximum** transmission voltage used on the UK super-grid?

- a 132 000 V.
- b 275 000 V.
- c 400 000 V.
- d 660 000 V.

42 Who is responsible for the meter tails prior to the electricity meter?

- a Local authority.
- b Installation owner.
- c Licencing authority.
- d Network operator.

43 What **must** as a **minimum** be provided at the origin of all single-phase installations?

- a Single-pole main switch.
- b Double-pole main switch.
- c Triple-pole main switch.
- d Quadruple-pole main switch.

- 44 What is the typically quoted **maximum** value of Z_e for a TN-S earthing arrangement?
- 0.20 Ω
 - 0.35 Ω
 - 0.65 Ω
 - 0.80 Ω
- 45 What is the earthing conductor connected to, at the origin of an installation forming part of a TN-C-S system?
- An incoming water pipe.
 - The general mass of earth.
 - Lead sheath of the supply cable.
 - The incoming supply neutral point.
- 46 What type of protection is provided by an RCD?
- Earth fault protection.
 - Overload protection.
 - Short circuit protection.
 - Basic protection.
- 47 Which is a method of providing Basic Protection as prescribed in BS 7671?
- Bonding.
 - Earthing.
 - Barriers.
 - Fuses.
- 48 What is the purpose of **main** protective bonding?
- To reduce the circuit Z_s .
 - To provide equipotential.
 - To reduce the installation Z_e .
 - To provide a fault path to earth.
- 49 What is the **maximum** disconnection time for a 32 A 230 V final circuit within a TN-S installation as given in BS 7671?
- 0.2 s
 - 0.4 s
 - 1 s
 - 5 s
- 50 Which is an extraneous-conductive-part?
- Metallic conduit system.
 - Metallic trunking system.
 - Metallic gas installation pipe.
 - Metallic case of a consumer unit.
- 51 What is the symbol for the total earth fault loop impedance path of a circuit?
- Z_s
 - R_1
 - R_2
 - Z_e
- 52 Which item of metalwork would be **earthed** within an electrical installation in a factory?
- Gas installation pipe.
 - Water installation pipe.
 - Metallic trunking system.
 - Lightening protection system.
- 53 What is the mV/A/m value for a 2.5 mm² multicore 70°C thermoplastic cable forming a single-phase circuit?
- 11
 - 18
 - 29
 - 44
- 54 What is the actual length of a wall if it measures 200 mm on a drawing with a scale of 1:50?
- 0.1 m.
 - 1.0 m.
 - 10 m.
 - 100 m.

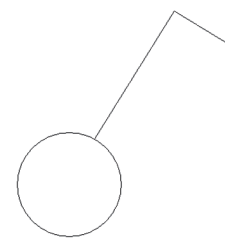


Figure 7

- 55 Which accessory would be represented by the symbol in **Figure 7**?
- Single-pole switch.
 - Double-pole switch.
 - Three-pole switch.
 - Four-pole switch.

- 56 What **must** be provided adjacent to a lathe in a machining workshop?
- a 30 mA RCD.
 - b Main switch.
 - c Circuit breaker.
 - d Emergency switch.
- 57 Which would be the **most** appropriate rating for a circuit breaker protecting a lighting circuit in a three-bedroom dwelling?
- a 1 A
 - b 6 A
 - c 20 A
 - d 32 A
- 58 A 4 mm² 70°C thermoplastic insulated and sheathed flat cable with protective conductor is to be installed Reference Method C.

What would be the **maximum** rating of a BS 3036 fuse providing overload protection for this cable?

- a 5 A
- b 15 A
- c 20 A
- d 30 A

- 59 What must be supplied to the client following the installation of a new circuit and an electric shower?
- a Electrical Installation Certificate.
 - b Minor Works Certificate.
 - c Electrical Installation Condition Report.
 - d Periodic Inspection Report.
- 60 What would be the voltage drop for a 28 m 1.5 mm² single-phase circuit supplying a load of 13 A using 70°C thermoplastic insulated and sheathed flat cable with protective conductor?
- a 16.0 V
 - b 11.5 V
 - c 10.6 V
 - d 6.9 V

NOW GO BACK AND CHECK YOUR WORK

- IMPORTANT -
Are the details at the top of the answer sheet correct?
Have you filled in your answers in INK in the appropriate boxes on the answer sheet?