



City & Guilds Level 3 End-point Assessment for Engineering Maintenance Technician (Dual Discipline) (9331-12)

**303 Electrical and Control and Instrumentation
Engineering Maintenance Technician**

Standard: ST1443, EPA Plan: Version 1.0

QN: 610/6878/0

Version 1.1

Last modified: July 2026

**Sample Knowledge Test
Sample paper, multiple-choice answer sheet and
mark scheme**

Version	Summary of changes	Section
1.0 May 2026	Document created	N/A
1.1 July 2026	Adjustments made to Questions 10, 19, 20, 24, 38	Pg 10, 14, 15, 17. 23

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1 Introduction

Area	Description
What is in this document	This document contains the sample test, answer sheet and mark scheme for the 9331-12 Engineering Maintenance Technician (Dual Discipline) Multiple-choice Test (303 Electrical and control and instrumentation).
Documents included:	• Sample questions • Answer sheet • Mark scheme Apprentices should be provided with the sample questions and the answer sheets. The mark scheme is to be used by employers/training providers/tutors to mark the completed test.

Note to employers/training providers/tutors: this sample paper-based version of the multiple-choice test is to support formative assessment activities.

Live versions of the multiple-choice test will be accessed using City & Guilds e-volve online system. Please refer to the EPA handbook for details on how to book and administer live tests.

2 9331-303 End-point Assessment – multiple-choice test (sample questions)

Test duration: 75 minutes

You should have the following for this test:

- a pen with black or blue ink
- multiple-choice questions answer sheet.

Read the following notes before you answer any questions.

- Attempt all questions.
- If you find a question difficult, leave it and return to it later.

This paper contains 50 multiple-choice questions worth 1 mark each.

This test paper is the property of City & Guilds.

How to complete the multiple-choice answer sheet

Each multiple-choice question shows four possible answers (lettered 'a', 'b', 'c', '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 'b' is correct, mark your answer with a cross like this:

1 a ☐ b ☒ c ☐ d ☐

If you change your answer, cancel your first choice by filling in the box then put a cross in the answer which you have now decided is correct, like this:

1 a ☐ b ☒ c ☒ d ☐

Q1	Which stage of the equipment life cycle involves site preparation, alignment, and initial testing? (1 mark)
	a) Concept and planning. b) Design and procurement. c) Installation and commissioning. d) Operation and utilisation.
Spec reference	6.1.1 (c)

Q2	Which statement best describes Condition-Based Maintenance (CBM)? (1 mark)
	a) Maintenance that is a holistic approach aiming for zero defects and breakdowns. b) Maintenance that is reactive and only performed after equipment failure. c) Maintenance that takes place at fixed intervals to prevent failure. d) Maintenance triggered by monitored data indicating degradation.
Spec reference	7.1.1 (b)

	a) DSE. b) PPE. c) COSHH. d) COMAH.
AO	AO1a
Spec reference	8.1.4 (b)

Q6	According to RIDDOR, how many consecutive days must an injury stop a worker from doing their usual job for before it must be reported to the HSE? (1 mark)
	a) More than 2 days. b) More than 3 days. c) More than 5 days. d) More than 7 days.
AO	AO1a
Spec reference	8.2.5 (a)

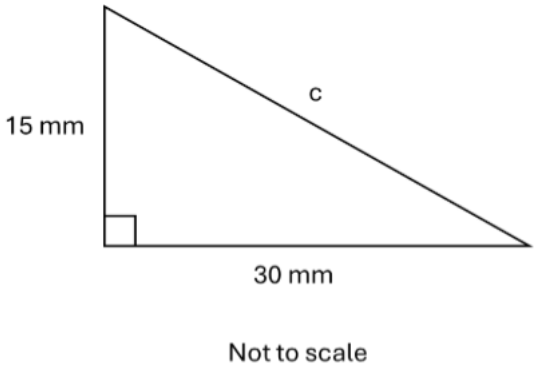
Q7	An engineer is employed by a maintenance engineering company. According to the PPE Regulations, what is a responsibility of the engineer prior to completing a maintenance activity? (1 mark)
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	a) To alter the condition of PPE for the activity. b) To complete a risk assessment to determine the PPE for the activity. c) To inspect PPE for any damage before using it in the activity. d) To provide PPE to other employees who are completing the activity.
AO	AO1a
Spec reference	8.2.7 (a) (ii)

Q8	Which standard gives the requirements for an Environmental Management System? (1 mark)
	a) BS 7671 b) BS 8888 c) ISO 9001 d) ISO 14001
AO	AO1a
Spec reference	K13.1.1 (a)

Q9	A minor spill has occurred that poses no immediate danger. What should be the first action according to spill-response procedures? (1mark)
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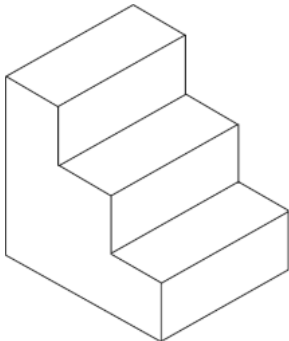
	a) Attempt to contain the spillage. b) Evacuate the area affected. c) Clean the area affected. d) Document the incident.
AO	AO1a
Spec reference	K13.2.1 (d)

Q10	The support bracket below forms a right angle. What is the length of side c to the nearest whole number using the formula $a^2 + b^2 = c^2$  (1 mark)
	a) 28 mm b) 34 mm c) 40 mm d) 45 mm
AO	AO1a
Spec reference	17.1.1 (e)

Q11	A series of holes in a material have the diameters shown in the table below. What is the mean diameter of the holes to one decimal place? All dimensions in mm			
	9.8	9.9	9.7	9.9
	10.0	9.8	9.9	9.7
	(1 mark)			
	a) 9.6 mm b) 9.7 mm c) 9.8 mm d) 9.9 mm			
AO	AO1a			
Spec reference	17.2.1 (a)			

Q12	What property is described as the ability of material to resist scratches and indentations? (1 mark)			
	a) Hardness. b) Magnetism. c) Ductility. d) Strength.			
AO	AO1a			
Spec reference	18.1.1 (c)			

Q13	What does contact between two incompatible metals in the presence of an electrolyte result in? (1 mark)
	a) Corrosion of both metals at the same speed. b) Faster corrosion of the more active metal. c) Faster corrosion of the less active metal. d) No corrosion of either of the two metals.
AO	AO1a
Spec reference	18.2.1 (d)

Q14	What type of engineering representation format is shown below?  (1 mark)
	a) Detail. b) Assembly. c) Isometric. d) Orthographic.
AO	AO1a

Spec reference	21.1.1 (d)
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Q15	What does this symbol represent on an electrical circuit diagram?  (1 mark)
	a) Lamp. b) Resistor. c) Signal diode. d) Light emitting diode.
AO	AO1a
Spec reference	21.2.1 (c)

Q16	Which best describes the application of the Internet of Things (IoT) in maintenance? (1 mark)
	a) Connected sensors that share data in real time. b) Remote access to data via cloud files sharing services. c) Use of physical equipment integrated with digital control. d) Use of pre-programmed robots to perform system repairs.
AO	AO1a
Spec reference	32.1.1 (b)

Q17	Which technology can be used to analyse data trends to support predictive maintenance? (1 mark)
	a) IoT. b) AI. c) HMI. d) PLC.
AO	AO1a
Spec reference	32.2.1 (d)

Q18	What is the role of digital twins in maintenance? (1 mark)
	a) To use virtual models to design brand new products from scratch. b) To use physical models of digital systems to simulate their performance. c) To use virtual models of physical systems to simulate their performance. d) To use virtual models to simulate system components that are not physically possible to make.
AO	AO1a
Spec reference	32.3.1 (c)

Q19	A maintenance engineer has been asked to replace a faulty power supply for a DC motor. The motor has a resistance of 50 Ω and draws a current of 0.24 A when in use. What voltage power supply should be used for the DC motor using the formula $V = I R$ (1 mark)
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	a) 0.005 V b) 12 V c) 50.2 V d) 208 V
AO	AO2
Spec reference	S13.1.1 (a) (i)

Q20	A maintenance engineer is tightening a bolt as part of re-assembling a machine. They are using a wrench that is 0.2 metres in length. The engineer applies a force of 90 N at a right angle to the end of the wrench handle. What is the amount of torque applied to the bolt using the formula $\tau = F \times r \times \sin(\theta)$ (1 mark)
	a) 450 Nm b) 90.2 Nm c) 18 Nm d) 0.002 Nm
AO	A02
Spec reference	S13.1.1 (a) (iv)

Q21	What is the employee's primary responsibility when working on electrical equipment? (1 mark)
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	a) Follow the employer's safety procedures and processes. b) Follow your own safety procedures and processes. c) Follow industry safety procedures and processes. d) Follow the manufacturer's safety procedures and processes.
AO	AO1a
Spec reference	33.1.2 (a)

Q22	Which statement best defines the relationship between BS7671 and Electricity at Work Regulations (EAWR)? (1 mark)
	a) BS7671 is statutory law and EAWR is a supporting code of practice. b) EAWR and BS7671 are legal acts of parliament that must be followed by law. c) BS7671 provides technical standards that support compliance with EAWR. d) BS7671 sets out employer responsibilities for electrical safety training under EAWR.
AO	AO1a
Spec reference	33.3.1 (a)

Q23	What is the main purpose of a Permit to Work document? (1 mark)
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	a) To provide basic safety guidance for employees who have not received any formal training. b) To authorise and control high risk work and ensure safety measures are in place. c) To increase operational efficiency by removing the need for routine safety checks. d) To ensure employees are provided with guidance on what to do when accidents occur.
AO	AO1a
Spec reference	33.4.2 (b)

Q24	An AC power supply provides an RMS voltage of 230 V to a circuit with a resistance of 60 Ω. Using Ohms Law $V = I \times R$, what is the current flowing through the circuit to two decimal places? (1 mark)
	a) 0.26 A b) 0.38 A c) 3.83 A d) 13.8 A
AO	AO1a
Spec reference	35.1.1 (a)

Q25	What is the basic operating principle of a three-phase motor? (1 mark)
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	a) It uses Alternating Current (AC) which produces a rotating magnetic field that causes the rotor to turn. b) It uses Direct Current (DC) which produces a rotating magnetic field that causes the rotor to turn. c) It allows current to transfer from a primary coil to a secondary coil without electrical connections which causes the rotor to turn d) It converts Alternating Current (AC) to Direct Current (DC) which causes the rotor to turn.
AO	AO1a
Spec reference	35.4.2 (a)

Q26	Which method is the most effective for protecting electrical components against electrostatic discharge (ESD) during assembly? (1 mark)
	a) Ensure all electrical components are non-conductive. b) Storing components within plastic bags. c) Wearing an earthed antistatic discharge wrist strap. d) Ensuring the main power supply is switched off.
AO	AO1a
Spec reference	35.5.2 b) (i)

Q27	What is the correct SI unit of measurement for electrical resistance? (1 mark)
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	d) Direct current conduction.
AO	AO1a
Spec reference	36.3.1 (a)

Q30	Which describes a key difference between series and parallel circuits? (1 mark)
	a) In a series circuit, a break in one component stops the flow of current in the circuit. b) In a series circuit, the voltage is the same across all components. c) In a parallel circuit, the current is the same through all components. d) In a parallel circuit, the total resistance remains the same through all components.
AO	AO1a
Spec reference	37.1.1 (a)

Q31	What is the function of a transistor in an electrical circuit? (1 mark)
	a) To store electrical energy. b) To amplify current or act as a switching device. c) To provide resistive force across an electrical circuit. d) To convert DC voltage to AC voltage.
AO	AO1a
Spec reference	37.3.1 (a) (ii)

	(1 mark)
	a) They are mainly referenced during troubleshooting tasks. b) They give the installation and connection details needed for safe work. c) They show component layout and connections to support accurate work. d) They provide information related to isolation procedures.
AO	AO1a
Spec reference	38.3.3 (a)

Q35	What is the primary application of Steel Wire Armoured (SWA) cables in electrical installations? (1 mark)
	a) To provide mechanical protection for power and auxiliary circuits. b) To supply low voltage applications for illumination including light emitting diodes (LEDs). c) To increase electrical earthing or bonding capacity within electrical installations. d) To provide a temporary means of connecting electrical components prior to testing.
AO	AO1a
Spec reference	39.1.1 (d)

Q36	According to IET Wiring Regulations, why is it important to follow the guidelines when selecting and installing cables? (1 mark)
	a) To allow unqualified personnel to install electrical systems safely. b) To reduce the length of cable required and help reduce material costs. c) To ensure the cables look neat and match the building décor.

Q39	What is the purpose of a Human Machine Interface (HMI) within a control and instrumentation system (1 mark)
	a) To allow operators to interact with the system in a user-friendly way. b) To allow operators direct access to underlying system program data. c) To allow the system to run independently of user input. d) To allow the system to function without sensor inputs
AO	AO1a
Spec reference	48.1.1 (e) (i)

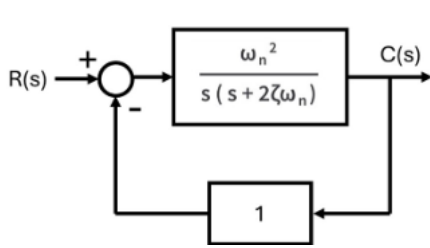
Q40	Which type of cable transmits data as pulses of light? (1 mark)
	a) Coaxial. b) Multipair. c) Multicore. d) Fibre-optic.
AO	AO1a
Spec reference	48.2.4 (c)

Q41	What type of device generates a voltage under pressure? (1 mark)
	a) Piezoelectric sensor. b) Capsule sensor. c) Bourdon tube. d) Strain gauge.
AO	AO1a

Spec reference	49.1.1 (b) (iv)
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Q42	Which device makes use of the Seebeck effect? (1 mark)
	a) Thermistor. b) Thermocouple. c) Infrared sensor. d) Resistance Temperature Detector.
AO	AO1a
Spec reference	49.1.2 (a) (ii)

Q43	What is a logic solver? (1 mark)
	a) A transducer within a Safety Instrumented System (SIS). b) A transmitter within a Safety Instrumented System (SIS). c) A controller within a Safety Instrumented System (SIS). d) A sensor within a Safety Instrumented System (SIS).
AO	AO1a
Spec reference	49.2.3 (b)

Q44	What type of control system is this?  (1 mark)
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	a) First order system. b) Second order system. c) Open-loop system. d) Non-feedback system.
AO	AO1a
Spec reference	50.2.1 (a)

Q45	What is the function of the Integral term within a three-term controller? (1 mark)
	a) To create new errors. b) To predict future errors. c) To respond to the current error. d) To eliminate steady state errors.
AO	AO1a
Spec reference	50.3.1 (a) (iii)

Q46	Which method of programming mimics relay circuitry? (1 mark)
	a) Text-based. b) Flow charts. c) Ladder logic. d) Function blocks.
AO	AO1a
Spec reference	51.1.1 (c) (i)

Q47	Which is the most typical application of a Direct Digital Control (DDC) system?
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	(1 mark)
	a) Small-scale automation. b) High-speed industrial automation. c) Large building HVAC automation. d) Safety-critical industrial process automation.
AO	AO1a
Spec reference	51.1.2 (b) (ii)

Q48	Which cybersecurity mitigation strategy scrambles readable data into unreadable code using a key? (1 mark)
	a) Firewall. b) Antivirus. c) Passwords. d) Encryption.
AO	AO1a
Spec reference	51.3.1 (b) (iv)

Q49	What type of diagram shows a high-level representation of groups of system components, with arrows representing signal flow between them? (1 mark)
	a) Block diagram. b) Circuit diagram. c) Wiring diagram. d) Schematic diagram.
AO	AO1a

Spec reference	52.1.1 (c) (i)
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Q50	What does a solid thick line represent on an engineering drawing? (1 mark)
	a) Visible outline. b) Hidden outline. c) Centre line. d) Leader line.
AO	AO1a
Spec reference	52.1.4 (b) (i)

3 9331-303 End-point Assessment – multiple-choice knowledge test (answer sheet)

Candidate name:

Date of test: Click or tap to enter a date.

1	a ☐	b ☐	c ☐	d ☐
2	a ☐	b ☐	c ☐	d ☐
3	a ☐	b ☐	c ☐	d ☐
4	a ☐	b ☐	c ☐	d ☐
5	a ☐	b ☐	c ☐	d ☐
6	a ☐	b ☐	c ☐	d ☐
7	a ☐	b ☐	c ☐	d ☐
8	a ☐	b ☐	c ☐	d ☐
9	a ☐	b ☐	c ☐	d ☐
10	a ☐	b ☐	c ☐	d ☐
11	a ☐	b ☐	c ☐	d ☐
12	a ☐	b ☐	c ☐	d ☐
13	a ☐	b ☐	c ☐	d ☐
14	a ☐	b ☐	c ☐	d ☐
15	a ☐	b ☐	c ☐	d ☐
16	a ☐	b ☐	c ☐	d ☐
17	a ☐	b ☐	c ☐	d ☐
18	a ☐	b ☐	c ☐	d ☐
19	a ☐	b ☐	c ☐	d ☐
20	a ☐	b ☐	c ☐	d ☐
21	a ☐	b ☐	c ☐	d ☐
22	a ☐	b ☐	c ☐	d ☐

23	a ☐	b ☐	c ☐	d ☐
24	a ☐	b ☐	c ☐	d ☐
25	a ☐	b ☐	c ☐	d ☐
26	a ☐	b ☐	c ☐	d ☐
27	a ☐	b ☐	c ☐	d ☐
28	a ☐	b ☐	c ☐	d ☐
29	a ☐	b ☐	c ☐	d ☐
30	a ☐	b ☐	c ☐	d ☐
31	a ☐	b ☐	c ☐	d ☐
32	a ☐	b ☐	c ☐	d ☐
33	a ☐	b ☐	c ☐	d ☐
34	a ☐	b ☐	c ☐	d ☐
35	a ☐	b ☐	c ☐	d ☐
36	a ☐	b ☐	c ☐	d ☐
37	a ☐	b ☐	c ☐	d ☐
38	a ☐	b ☐	c ☐	d ☐
39	a ☐	b ☐	c ☐	d ☐
40	a ☐	b ☐	c ☐	d ☐
41	a ☐	b ☐	c ☐	d ☐
42	a ☐	b ☐	c ☐	d ☐
43	a ☐	b ☐	c ☐	d ☐
44	a ☐	b ☐	c ☐	d ☐
45	a ☐	b ☐	c ☐	d ☐
46	a ☐	b ☐	c ☐	d ☐
47	a ☐	b ☐	c ☐	d ☐
48	a ☐	b ☐	c ☐	d ☐
49	a ☐	b ☐	c ☐	d ☐
50	a ☐	b ☐	c ☐	d ☐

Number of correct answers: / 50

4 9331-303 End-point Assessment – multiple-choice knowledge test (mark scheme)

Grading

Fail – 34 marks (68%)

Pass – 35 marks (70%)

Question number	Key	Question number	Key
1	C	26	C
2	D	27	D
3	D	28	A
4	B	29	B
5	A	30	A
6	D	31	B
7	C	32	D
8	D	33	A
9	A	34	B
10	B	35	A
11	C	36	D
12	A	37	D

Question number	Key	Question number	Key
13	B	38	D
14	C	39	B
15	A	40	A
16	A	41	D
17	B	42	A
18	C	43	B
19	B	44	C
20	C	45	B
21	A	46	D
22	C	47	C
23	B	48	C
24	C	49	D
25	A	50	A

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City & Guilds

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