City & Guilds Level 3 End-point Assessment for Maintenance and Operations Engineering Technician (9320-302)

Control and Instrumentation Technician pathway

Standard: ST0154
EPA Plan: Version 1.1/1.4

March 2025 Version 1.2

Sample Knowledge Test

Sample paper, multiple choice mark sheet and mark scheme

Contents

Version and date	Change detail	Section
V1 June 2020	Document created	
V1.2 March 2025	ST0154/AP02 removed from the title. ST0154/AP02 added to the front page.	Throughout Front page

1 Introduction

What is in this document

This document contains the Sample Knowledge test for the City & Guilds End-point Assessment for Maintenance and Operations Engineering Technician (9320-302) – Multiple Choice Knowledge test.

How to use the forms

The following documents are included;

- Sample question knowledge test
- Multiple choice answer sheet
- Mark scheme

Apprentices should be provided with the sample questions and the answer sheet.

The mark scheme is to be used by employers/training providers/tutors to mark the completed tests.

9320-302 End-point Assessment – Knowledge test

Version 1.1 – March 2025

You should have the following for this test

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

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 30 multiple choice questions worth 1 mark each.

The time allowed for this test is 45 minutes.

The drawings are not to scale.

This question 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' 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 'b' is correct, mark your answer with a cross like this:

1 a ☐ b ☒ c ☐ d ☐

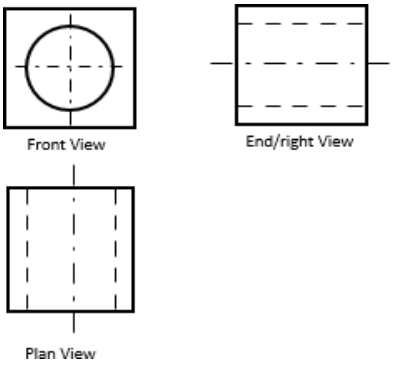
If you change your answer, cancel your first choice by filling in the box then put a cross in the answer which you have now decided is correct like this:

1 a ☐ b ■ c ☒ d ☐

1. Which electrical component does this circuit symbol represent?

a Battery
b Lamp
c Resistor
d Transformer

2. What type of orthographic projection is shown in this picture?



a First angle
b Second angle
c Third angle
d Isometric

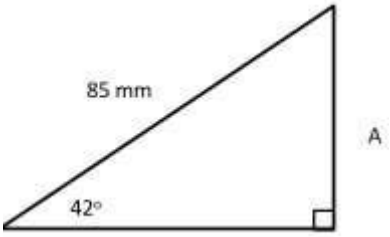
3. An engineer has measured a voltage of 4.5 V across a 1 kΩ resistor. How much current is flowing through the resistor?

a 0.0045 A
b 4.5 A
c 222.22 A
d 4500 A

4. An engineer is selecting a material for a socket for an electrical plug. Which material would be the most suitable for this application?
   a Copper
   b Brass
   c Thermoplastic
   d Thermosetting plastic

5. Which type of corrosion is described in this statement: 'the preferential corrosion of one metal when it is in electrical contact with another metal, in the presence of an electrolyte'
   a Galvanic
   b Oxidation
   c Pitting
   d Rusting

6. Calculate the length of side A, rounding to the nearest whole number.



   a 49 mm
   b 57 mm
   c 63 mm
   d 77 mm

7. What does this symbol represent on a piping layout?

   a Ball valve
   b Gate valve
   c Globe valve
   d Needle valve

8. What is the definition of friction?
   a The heat generated between two surfaces in contact with each other
   b The force pulling two surfaces together
   c The resistance that a surface encounters when moving over another surface
   d The amount of material worn away from a surface

9. Flow meters are normally calibrated. In this context, what does calibration mean?
   a Recording where the flow meter was purchased and what it has been used to measure
   b Using a flow meter to measure an activity to ensure it is within specification
   c Collecting documentary evidence that measurements carried out in production maintain the desired level of accuracy at all times
   d Ensuring that the flow meter gives the same measurement as a device of known accuracy

10. Which piece of legislation details the requirements for reporting dangerous occurrences and accidents?
   a PUWER
   b RIDDOR
   c COSHH
   d HASAW

11. Which type of fire extinguisher should be used to extinguish an electrical fire?
   a Carbon dioxide
   b Foam
   c Water
   d Wet chemical

12. An environmental condition that could lead to accidents in the workplace is:
   a Workers not wearing the provided PPE
   b Appropriate ventilation
   c Lack of management control of the workforce
   d Inadequate lighting

13. What does the colour blue mean on a safety sign?
   a The activity shown is prohibited
   b The instruction shown is mandatory
   c The sign provides information about an emergency exit
   d It is a warning sign

14. What is the purpose of the ISO14001 standard?
   a To help companies document the elements needed to maintain an efficient quality system
   b To specify the requirements for environmental management systems
   c To ensure that all machines and processes in the workplace do not affect the environment
   d To ensure that workplaces are safe and accidents are reported to appropriate authorities

15. A worker is lifting a sensor unit to put it into a machine. The unit weighs 10 kg. What would be an appropriate item of personal protective equipment to reduce the risks associated with this activity?

a Safety boots

b Ear muffs

c Hard hat

d Glasses

16. During maintenance, what is meant by system isolation?

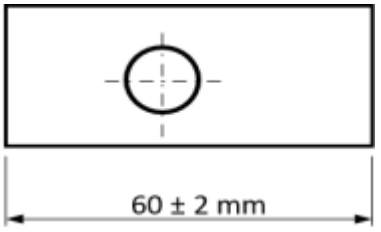
a Removing a machine or process from the workshop, so it cannot interfere with other activities

b Working independently on a machine without assistance from other engineers

c A safety document that permits certain people to carry out specific work within a specified time frame

d A safety procedure that ensures machines are shut off and cannot be started up again prior to the completion of work

17. What is the maximum acceptable length of the part in this drawing?



a 58 mm

b 60 mm

c 61 mm

d 62 mm

18. An instrument that can be used to measure voltage, current and resistance is:

a Ammeter

b Multimeter

c Ohmmeter

d Voltmeter

19. The technique which involves joining two pieces of wire by deforming them is:

a Crimping.

b De-soldering.

c Screwing.

d Soldering.

20. A first aider has been called to treat a victim of electric shock. The actions the first aider should take first is:
    a Check the person for burns or other wounds
    b Check the person is breathing
    c Perform CPR on the victim
    d Separate the victim from the power source

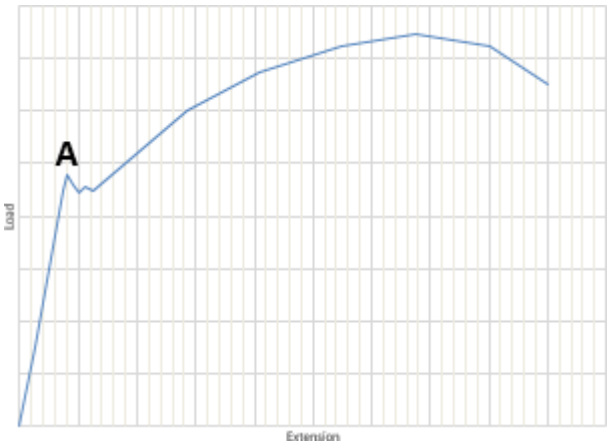
21. The sudden flow of electricity between two electrically charged objects caused by contact or an electrical short can be defined as:
    a Electrostatic absorption.
    b Electrostatic deflection.
    c Electrostatic discharge.
    d Electrostatic exchange.

22. What is the SI base unit for capacity?
    a Litre
    b Gallon
    c Metre
    d Kilogram.

23. What is measured in units of kg m^{-3}?
    a Power
    b Density
    c Capacity
    d Conductivity.

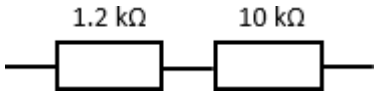
24. What is the opposition to the flow of electric current called?
    a Potential difference
    b Power
    c Resistance
    d Voltage.

25. This graph shows the results of a test to determine the strength of a low carbon steel. What value is represented by point A?



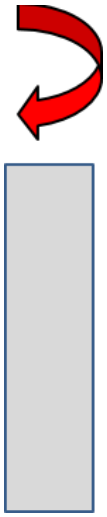
a Yield strength
b Ultimate tensile strength
c Compressive strength
d Proof strength.

26. Calculate the total resistance of the circuit shown.



a 8.8 kΩ
b 11.2 kΩ
c 12.1 kΩ
d 20.2 kΩ

27. What type of force is represented by the arrow in this image?



a Compression
b Shear
c Tension
d Torsion

28. A metal bar is being used as part of a lifting rig. It is lifting a weight of 3600 N. The cross sectional area over which the stress is applied is 180 mm2. What is the stress in the bar during the lifting operation?

a 0.5 N mm^{-2}
b 18 N mm^{-2}
c 20 N mm^{-2}
d 24 N mm^{-2}

29. An engineer is inspecting an electric lamp. The lamp has a voltage of 9 V across it and a current of 3 A flowing through it. What is the power dissipated by the lamp?

a 3 W
b 6 W
c 12 W
d 27 W

30. A metal plate has a thermal conductivity of 75 W m^{-1} $^oC^{-1}$. It is 0.05 m thick and the area of heat transfer is 1 m^2. The temperature is 200°C on one side and 50°C on the other. Calculate the heat transfer through the plate.

Heat transfer Q = (k/s) A dT, where k is the thermal conductivity of the material, s is the material thickness, A is the area of heat transfer and dT is the difference in temperature.

a 1.5 kJ
b 56.25 kJ
c 112.5 kJ
d 225 kJ

9320-302 Knowledge Test Multiple Choice Answer sheet (Sample Test)

Test: | | | | | - | | | |

Candidate name: *First name* *Last name*

(Please print)

Date of test: dd / mm / yy

1	a	b	c	d	16	a	b	c	d
2	a	b	c	d	17	a	b	c	d
3	a	b	c	d	18	a	b	c	d
4	a	b	c	d	19	a	b	c	d
5	a	b	c	d	20	a	b	c	d
6	a	b	c	d	21	a	b	c	d
7	a	b	c	d	22	a	b	c	d
8	a	b	c	d	23	a	b	c	d
9	a	b	c	d	24	a	b	c	d
10	a	b	c	d	25	a	b	c	d
11	a	b	c	d	26	a	b	c	d
12	a	b	c	d	27	a	b	c	d
13	a	b	c	d	28	a	b	c	d
14	a	b	c	d	29	a	b	c	d
15	a	b	c	d	30	a	b	c	d

Number of correct answers: / 30

Grade: Pass /Merit/Distinction/ Fail

Marked by:

Date: dd / mm / yy

9320-302 Knowledge Test Multiple Choice Mark Scheme

Marks: 30 Pass: 60% (18 Marks) Merit:75% (22 Marks) Distinction:85% (25 Marks)

Question no	Key	Question no	Key
1	**a**	16	**d**
2	**a**	17	**d**
3	**a**	18	**a**
4	**d**	19	**a**
5	**a**	20	**d**
6	**b**	21	**c**
7	**b**	22	**a**
8	**c**	23	**b**
9	**d**	24	**c**
10	**b**	25	**a**
11	**a**	26	**b**
12	**d**	27	**d**
13	**b**	28	**c**
14	**b**	29	**d**
15	**a**	30	**d**

About City & Guilds

Founded in 1878 to develop the knowledge, skills, and behaviours needed to help businesses thrive, we offer a broad and imaginative range of products and services that help people achieve their potential through work based learning.

We believe in a world where people and organisations have the confidence and capabilities to prosper, today and in the future. So we work with like-minded partners to develop the skills that industries demand across the world.

City & Guilds Group
Giltspur House
5–6 Giltspur Street
London EC1A 9DE
www.cityandguilds.com