City & Guilds Level 3 End-point Assessment for Maintenance and Operations Engineering Technician (9320-303)

Electromechanical 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 January 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 (9320-303) (Electromechanical Technician) – Multiple Choice Knowledge test.

How to use the forms

The following documents are included;

- Sample question knowledge tests
- Multiple choice answer sheets
- Mark schemes

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

The mark schemes are to be used by employers/training providers/tutors to mark the completed tests.

9320-303 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/short answer questions answer sheets

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.

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:

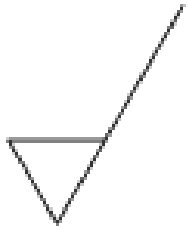
1 a ☐ b ☒ c ☐ d ☐

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 ☐

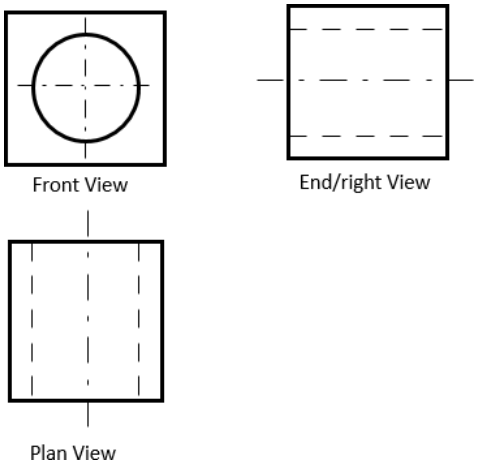
9320-303
End-point Assessment - Sample Knowledge Test Mark Sheet

1. What is the meaning of this symbol on an engineering drawing?



a)) Material removal not allowed
b)) Welded joint
c)) Thread size
d)) Surface to be machined

2. What type of orthographic projection is this?

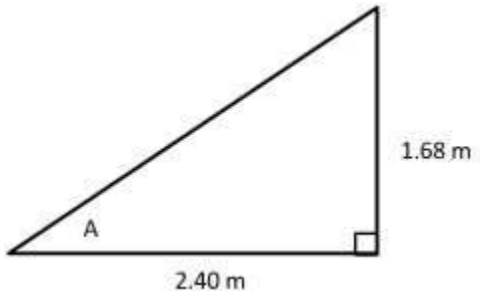


a)) First angle
b)) Second angle
c)) Third angle
d)) Isometric

3. A component has a nominal width of 25 mm with a tolerance of 1.6 mm. What is the minimum acceptable width of the component?
   a)) 23.4 mm
   b)) 24.2 mm
   c)) 25 mm
   d)) 26.6 mm

4. 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

5. A piece of material needs to be marked out for cutting. Calculate the angle A, to the nearest degree.



   a)) 35 degrees
   b)) 39 degrees
   c)) 44 degrees
   d)) 46 degrees

6. A 5m long steel beam is being heated from 100ºC to 600ºC ($\Delta T = 500^{o}C$). Assuming that it is not constrained, calculate the change in length.
   For steel, $\alpha = 12 \times 10^{-6}\ ^{o}C^{-1}$ and the change in length = $\alpha \times L \times \Delta T$.
   a)) 0.006 m
   b)) 0.024 m
   c)) 0.030 m
   d)) 0.036 m

7. An engineer needs to produce a list of the components needed for an electrical circuit and calculate their overall cost. Which is the most appropriate software tool for this task?
   a)) Desktop publishing software
   b)) Presentation software
   c)) Spreadsheet software
   d)) Word processing software

8. Which of the following defines what is meant by 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. You have obtained an item of lifting equipment needed to lift a large product, but noticed that its approval expired the previous week. What is the appropriate course of action?
   a)) Test the equipment by lifting a small load first and if it passes use it to lift the product
   b)) Carry out the lifting task then report the equipment to your supervisor
   c)) Test the product by lifting a large weight first and if it passes use it to lift the product
   d)) Report the equipment and return it to the appropriate person

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

11. 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

12. The 4C's of positive health and safety are competence, control, co-operation and … ?
   a)) capability
   b)) coercion
   c)) communication
   d)) concentration

13. The 'fire triangle' lists the necessary ingredients for a fire as fuel, heat and … ?

a)) ignition

b)) flammable material

c)) hydrogen

d)) oxygen

14. RPE can be used to provide protection against which of the following?

a)) entanglement in rotating parts

b)) bright light from a welding arc

c)) harmful particulates, dust and fumes

d)) noise from machining operations

15. A worker is lifting an electrical motor to put it into a machine. The motor 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. Which of these is a hazard that could result from incorrect handling of oils in the workplace?

a)) hazardous materials need to be stored in a locked metal cabinet

b)) excessive vibration of hand tools

c)) the need to wear gloves to prevent skin contact

d)) slipping due to spillages

17. What type of gear is shown in this picture?

a)) bevel gear

b)) rack and pinion

c)) spur gear

d)) worm gear

18. Input-to-output and unit substitution are types of … ?

a)) fault location technique
b)) assembly method
c)) dismantling method
d)) isolation procedure

19. What type of bearing is this?

a)) ring bearing
b)) roller bearing
c)) thrust bearing
d)) uniaxial elliptical bearing

20. What feature is indicated by the arrow in this image of a shaft?

a)) keyway
b)) helical gear
c)) lubrication channel
d)) spline

21. What is meant by backlash when adjusting gears?

a)) The compressive force between two mating gears that pushes the unsupported gear backwards
b)) The amount a gear rotates in the direction opposite to the applied torque when the torque stops
c)) Tying the gears together to make sure that they are permanently connected
d)) The clearance between mating gear teeth to enable the gears to mesh without binding

22. What is the SI base unit for capacity?

a)) litre
b)) gallon
c)) metre
d)) kilogram

23. Which of the following is measured in units of kg m^{-3}?

a)) power
b)) density
c)) capacity
d)) conductivity

24. Which of the following is measured in units of pascals?

a)) weight
b)) temperature
c)) electrical conductivity
d)) stress

25. Which of these statements about friction is correct?

a)) kinetic friction is dependent on velocity
b)) friction depends upon the nature of the surfaces in contact
c)) the coefficient of kinetic friction is always greater than the coefficient of static friction
d)) friction is proportional to the area of contact

26. What type of motion is shown in this diagram?

a)) linear
b)) rotary
c)) oscillating
d)) reciprocating

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

a)) Compression
b)) Shear
c)) Tension
d)) Torsion

28. A box of equipment is pushed 2 m along a flat surface by applying a force of 30 N. What is the work done when moving the box?

a)) 15 J
b)) 30 J
c)) 45 J
d)) 60 J

29. An electric heater has a power rating of 1500 W and works off a supply voltage of 230 V. What is the heater's current rating?

a)) 0.2 A
b)) 6.5 A
c)) 1270 A
d)) 1720 A

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

9320-303 End-point Assessment Knowledge Test Multiple choice mark 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

9320-303 End-point Assessment Knowledge Test Multiple Choice Mark Scheme

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

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

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