Specimen Paper

SEC 37 Engineering Technology

2027

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Specimen Assessment: Sample Controlled Paper

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
SAMPLE CONTROLLED PAPER

SUBJECT:	**Engineering Technology**
PAPER:	**Level 1 – 2 – 3**
DATE:	
TIME:	**2 Hours**

Directions to Candidates

Answer **ALL** questions in the space provided.

The use of non-programmable electronic calculators is allowed.

This paper carries a total of 100 marks.

THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR AFTER THE EXAMINATION

For examiners' use only:

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Score																					
Maximum	4	4	6	4	6	4	6	8	6	7	4	4	4	2	4	6	4	9	4	4	100

1. Name each of the following safety signs.

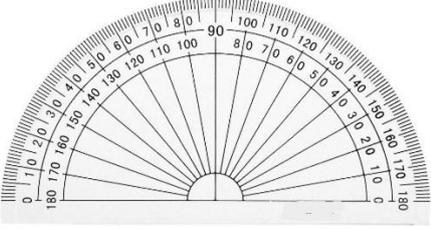|		
a.	 *(Source: https://shorturl.at/auRW5)*	_____ (1)
b.	 *(Source: https://shorturl.at/gkmZ5)*	_____ (1)
c.	 *(Source: https://shorturl.at/orHOR)*	_____ (1)
d.	 *(Source: https://shorturl.at/ioO26)*	_____ (1)

(Total: 4 marks)

2. Describe the test used to examine a material's strength when subjected to two opposite forces.

_____

_____

_____

_____

_____

_____

_____

(Total: 4 marks)

3. Identify the following measuring and marking out tools.

a.	(Source: https://shorturl.at/zCFMW)	_____ (1)
b.	(Source: https://shorturl.at/fgnp1)	_____ (1)

c.	 *(Source: https://shorturl.at/wxAQ0)*	_____ (1)
d.	 *(Source: https://shorturl.at/adY58)*	_____ (1)
e.	 *(Source: https://shorturl.at/gsEY9)*	_____ (1)
f.	 *(Source: https://rb.gy/g50n37)*	_____ (1)

(Total: 6 marks)

4.   Outline the function of the following measuring and marking out tools.
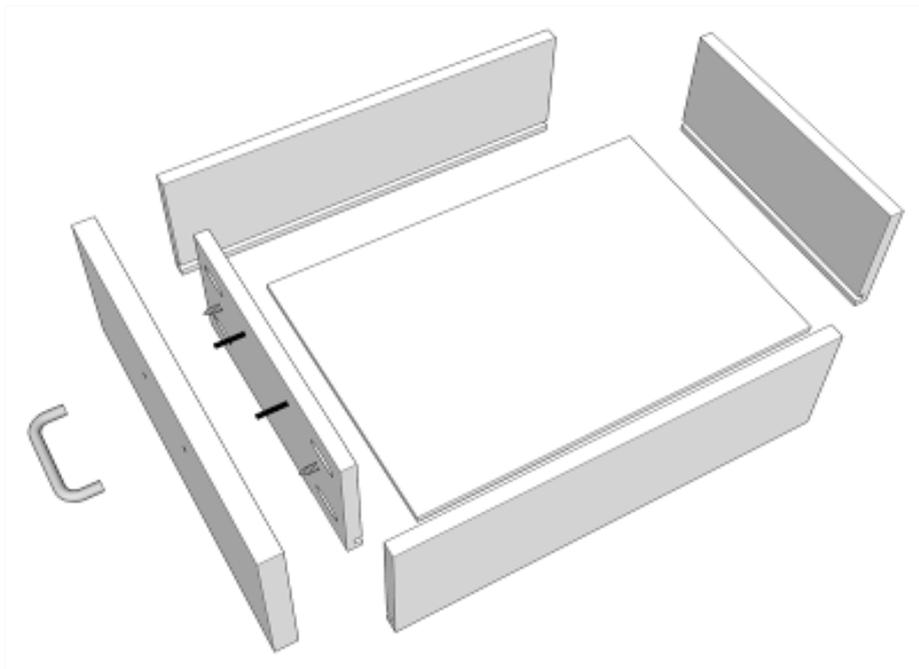
a. Micrometre:

_____

_____

_____

_____ (2)

b. Centre punch:

_____

_____

_____

_____ (2)

(Total: 4 marks)

5. Justify a suitable joining method for each of the following scenarios:

Scenario 1: Joining four wooden sides to form the inside of a drawer.

(Source: https://shorturl.at/vy389)

_____

_____

_____

_____ (3)

Scenario 2: Joining permanently a metal sheet net of a letter box.

(Source: https://shorturl.at/knFSV)

_____

_____

_____
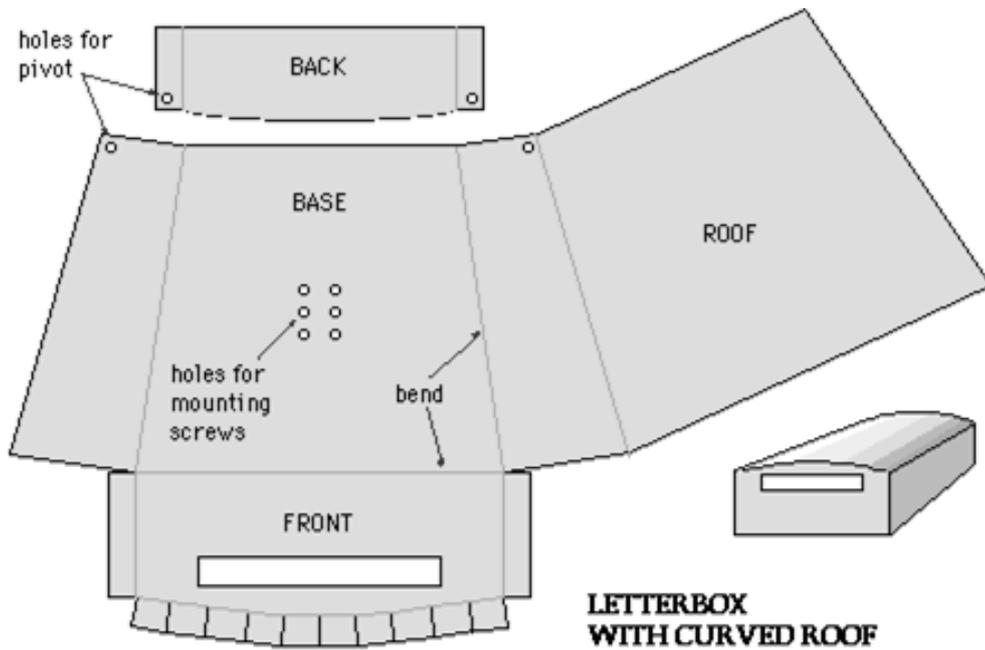
_____ (3)

(Total: 6 marks)

6.   Identify the following assembly and finishing tools.

a.	*(Source: https://rb.gy/wzv9it)*	_____ (1)
b.	*(Source: https://rb.gy/yd1oou)*	_____ (1)

c.	 *(Source: https://rb.gy/8yn0sn)*	_____ (1)
d.	 *(Source: https://t.ly/Bp9KD)*	_____ (1)

(Total: 4 marks)

7. Describe **TWO** preventive measures when using assembly and finishing tools and equipment.
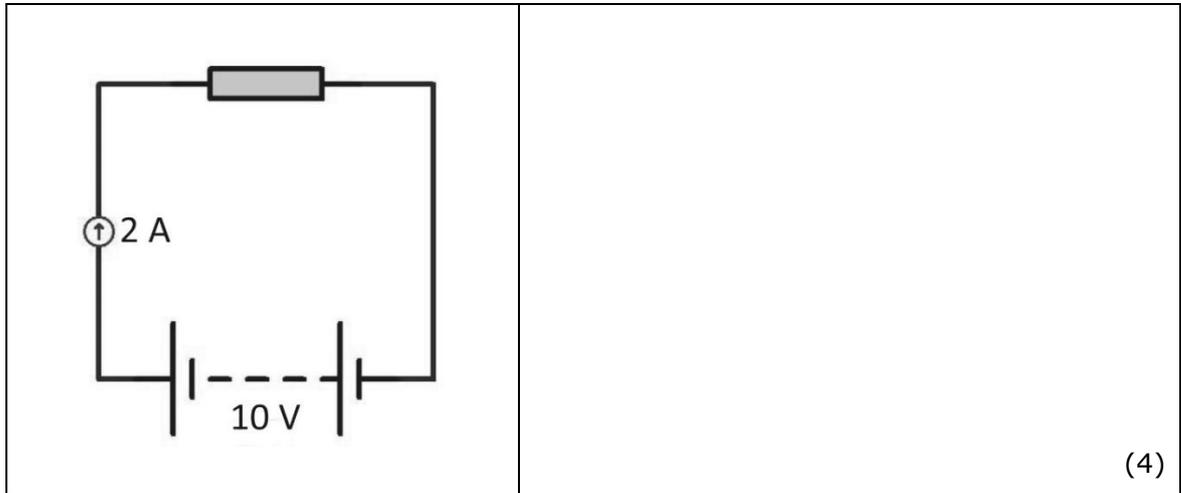
Preventive Measure 1: _____

_____

_____

_____

_____

_____ (3)

Preventive Measure 2: _____
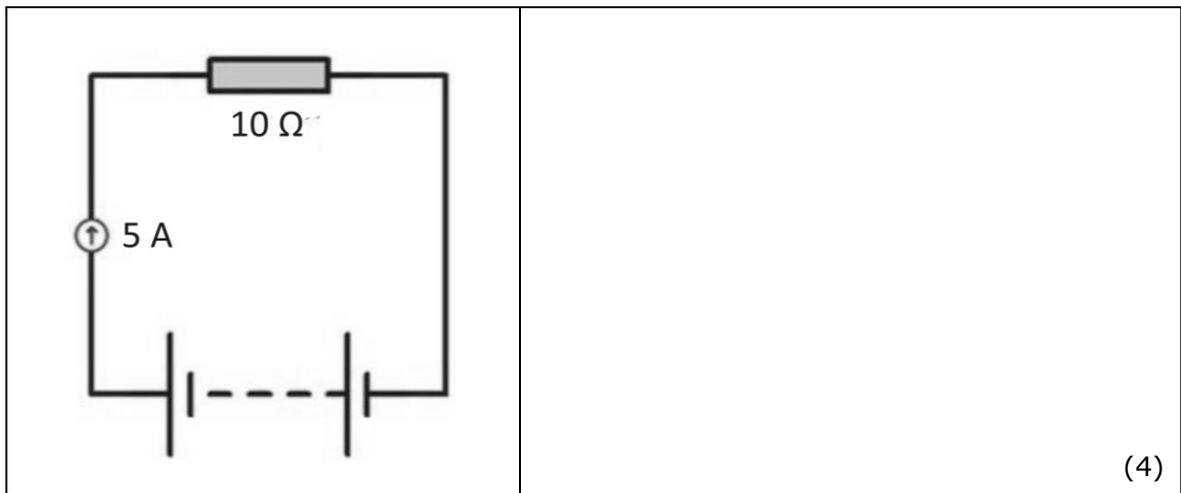
_____

_____

_____

_____

_____ (3)

(Total: 6 marks)

8. Calculate the missing value in the following circuits using Ohm's law. Show all your working.

    a) When a circuit is connected to a 10 V supply voltage, a current of 2 A flows in the circuit. Calculate the resistance of the circuit.
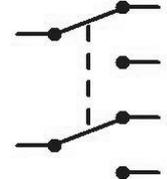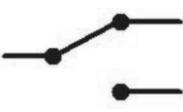

    (4)

    b) When a battery is connected to a 10 Ω resistor, a current of 5 A flows across the circuit. Calculate the supply voltage.

    (4)

    (Total: 8 marks)

9. Identify the different types of switches in terms of poles and throws in the table below.

SPST (Single Pole, Single Throw) – SPDT (Single Pole, Double Throw)			
DPDT (Double Pole, Double Throw) – Push to break			

a.		_____	(2)
b.		_____	(2)
c.		_____	(2)

(Total: 6 marks)

10. Calculate the total resistance for the following circuits consisting of a combination of series and parallel resistor circuits. Show all your working.

   a. Resistor Circuit 1

   _____

   _____

   _____

   _____
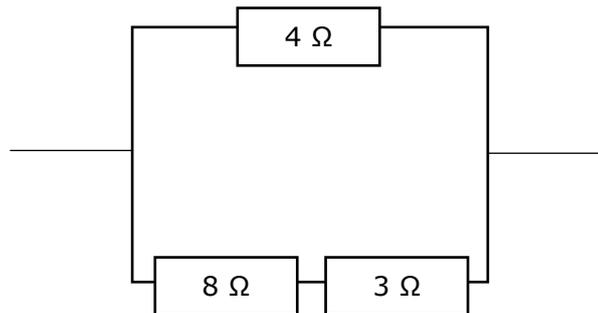
   _____ (3)

b. Resistor Circuit 2
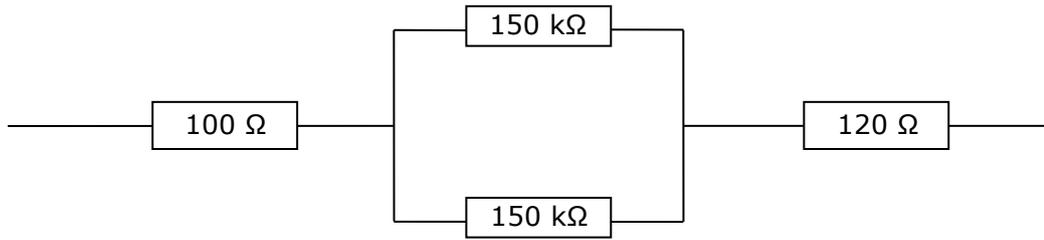
(4)

(Total: 7 marks)

11. Identify the types of capacitors shown below by writing the corresponding letter in the following table. There is only **ONE** correct answer for each.

Capacitors	
 (Source: https://images.app.goo.gl) **A**	 *(Source: https://www.diytrade.com)* **C**
 (Source: https://www.alibaba.com) **B**	 *(Source: https://eu.mouser.com/images)* **D**

Capacitor	Letter
Power film	(1)
Electrolytic	(1)
Ceramic	(1)
Film	(1)

(Total: 4 marks)

12. List **FOUR** IC (Integrated Circuit) package types.

Package Type 1: _____ (1)

Package Type 2: _____ (1)

Package Type 3: _____ (1)

Package Type 4: _____ (1)

(Total: 4 marks)

13. When manufacturing and constructing a PCB (Printed Circuit Board) one is exposed to certain hazards.

State **TWO** hazards that might be present when soldering and etching a PCB.

Soldering a PCB

Hazard 1: _____ (1)

Hazard 2: _____ (1)

Etching a PCB

Hazard 1: _____ (1)

Hazard 2: _____ (1)
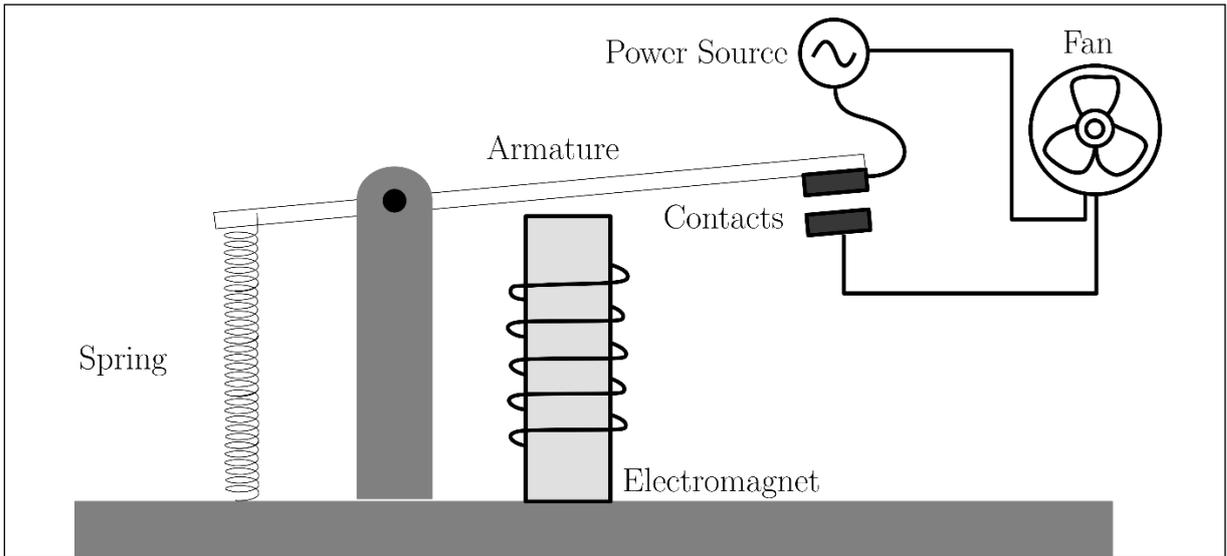
(Total: 4 marks)

14. Name **TWO** different types of electrical power generation plants.

Type 1: _____ (1)

Type 2: _____ (1)

(Total: 2 marks)

15. A relay is used to turn on/off a fan, as shown below.

Describe the function of the Electromagnet, Spring, Armature, and Contacts in turning on/off the fan.

_____

_____

_____

_____

_____

_____

_____

_____

(Total: 4 marks)

16. List **SIX** different types of bearings.

    Type 1: _____ (1)

    Type 2: _____ (1)

    Type 3: _____ (1)

    Type 4: _____ (1)

    Type 5: _____ (1)

    Type 6: _____ (1)

    (Total: 6 marks)

17. A toaster has a power rating of 1200 W and is used with a supply voltage of 240 V.

    Which fuse from 3 A, 5 A, or 13 A fuses would be most appropriate for the toaster's plug? Show all your calculations to justify your choice.

    (Total: 4 marks)

18. Explain **THREE** maintenance and care practices that should be adopted for power tools and machinery.

    Practice 1: _____

    _____

    _____

    _____ (3)

Practice 2: _____

_____

_____

_____ (3)

Practice 3: _____

_____

_____

_____ (3)

(Total: 9 marks)

19. Match the fire scenario indicated to its correct class by drawing a line between the two.

Type of Fire
A trash can filled with paper catches fire
A hairdryer catches fire
A gas cylinder catches fire
A jerrycan filled with diesel catches fire

Class of Fire
Class B
Class C
Class A
Class E

(Total: 4 marks)

20. List **FOUR** different types of documentation used when constructing electro-mechanical products.

Type 1: _____ (1)

Type 2: _____ (1)

Type 3: _____ (1)

Type 4: _____ (1)

(Total: 4 marks)

Specimen Assessment: Sample Marking Scheme for Controlled Paper

L-Università ta' Malta

SUBJECT: **Engineering Technology**

PAPER: **Level 1 – 2 – 3**

DATE:

TIME: **2 Hours**

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
1	4	1 mark for each correct safety sign named	a. No Smoking b. Flammable Material c. Safety Helmet Must be Worn. d. First Aid

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
2	4	1 mark if the test is correctly identified but not described	Shear test
		4 marks for the correct test identified and described	A shear test is conducted to assess a material's ability to withstand forces. Its aim is to measure and record the stress the material can endure. By clamping a specimen of the material at both ends and applying forces in opposite directions, the test measures the shear stress the material can withstand before failure. This process causes layers of the material to slide past each other in opposite directions.
3	6	1 mark for each correct tool identified	a. Sliding Bevel b. Height Gauge c. Protractor d. Scriber e. Chalk line f. Mortise Gauge
4	4	2 marks each for correct outline	a. Micrometre: A measuring device that gauges small distances or thicknesses between its two surfaces, wherein one face can be adjusted closer to or farther away from the other by rotating a screw with a finely threaded mechanism.
5	6	1 mark for each valid joining method if it is only stated but not justified	Scenario 1: screws Accept any other valid answers.
		3 marks for each valid joining method identified and justified	Scenario 1: To assemble the four wooden sides to create the interior of a drawer, screws are required. This joining method is not permanent, offering flexibility if there is a need to disassemble the drawer for transportation. Accept any other valid answers.

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
6	4	1 mark for each item identified	a. Spanners b. Screw Drivers c. Riveter d. Sander
7	6	1 mark for each preventive measure correctly if it is only named but not described	Use the suitable tool for the proper job. Accept any other valid answers.
		3 marks for each preventive measure described	When working with cutting and drilling equipment, the use of suitable tools is essential for both the quality of the finished task and, more importantly, the health and safety of the workers. Using the wrong tool can easily lead to damage, putting yourself or others at risk of injuries. Accept any other valid answers.

8	8	2 marks for each circuit's correct subject of the formula and working	a) R = V / I
			   R = 10 / 2
			
			b) V = I x R
			   V = 5 x 10

		2 marks for each circuit's correct final answer value including SI unit	a) = 5 Ω b) = 50 V Only award 1 mark for a correct final answer if no SI unit, or an incorrect SI unit, is provided.

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
9	6	2 marks for each correct switch type identified	a. DPDT b. SPDT c. Push to break switch.
10	7	Resistor Circuit 1: 1 mark for the correct calculation of the series circuit	Resistance of series circuit = 8 + 3 = 11 Ω

		Resistor Circuit 1:
		2 marks for the correct calculation of the total resistance
			Total resistance = Product / Sum
			                             = (4 x 11) / (4 + 11)
			                             = 2.93 Ω

		Resistor Circuit 2:
		2 marks for the correct calculation of the parallel circuit
			Resistance of parallel circuit = Product / Sum
			                             = (150000 x 150000) / (150000 + 150000)
			                             = 75000 Ω

		Resistor Circuit 2: 2 marks for the correct calculation of the total resistance	Total resistance = 75000 + 100 + 120 = 75220 Ω
11	4	1 mark for each correct capacitor identified	<table><tr><td>Power film capacitor</td><td>D</td></tr><tr><td>Electrolytic capacitor</td><td>A</td></tr><tr><td>Ceramic capacitor</td><td>B</td></tr><tr><td>Film capacitor</td><td>C</td></tr></table>
12	4	1 mark for each package type listed	The following **FOUR**, or other valid ones: surface mount, through hole, single in-line, dual in-line

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
13	4	1 mark for each hazard stated	Soldering: burns, dangerous fumes from solder Etching: inhaling dangerous fumes, chemical spill Accept any other valid answers.
14	2	1 mark for each type named	Any **TWO** from the following, or other valid ones: fossil-fuel, nuclear, geothermal, hydroelectric, wind, solar.
15	4	1 mark for each part correctly described	The **electromagnet** attracts the armature when it is magnetised. The **spring** pulls back the armature when the electromagnet is not magnetised, allowing the armature to open/close the contacts. The **armature** is able to move down when attracted by the electromagnet, or up when not magnetised, allowing the contacts (pins) to become closed/open accordingly. The **contacts** (pins) are normally open when the electromagnet is not magnetised – turning the fan off, and become closed when magnetised, allowing the current to flow and turn the fan on.
16	6	1 mark for each type listed	Any **SIX** from the following, or other valid ones: ball bearing, roller bearing, tapered roller bearing, thrust bearing, magnetic bearing, fluid bearing.

Question No.	Total Marks	Allocation of Marks	Example of Expected Answer
17	4	1 mark for the correct formula	P = V x I
		1 mark for the correct working	1200 = 240 x I I = 1200 / 240 I = 5 A
		2 marks for the correct fuse chosen	Appropriate Fuse: 13 A If the candidate chooses the 5 A fuse, only marks for the formula and the working should be awarded, if these are correct. However, if the candidate makes a mistake in the working, but chooses a fuse with a higher rating than the derived answer, the marks for the choice of fuse should still be awarded.
18	9	1 mark for each practice if it is only correctly stated but not explained	Ensure proper cleaning of equipment from dust or particulate matter. Accept any other valid answers.
		3 marks for each practice that is correctly explained	Equipment should be properly cleaned from dust or particulate matter as debris will increase the wear-and-tear of the equipment and is also hazardous when operating it. Accept any other valid answers.
19	4	1 mark for each correct match	A trash can filled with paper catches fire — Class B A hairdryer catches fire — Class C A gas cylinder catches fire — Class A A jerrycan filled with diesel catches fire — Class E
20	4	1 mark for each type of documentation listed	Any **FOUR** from the following, or other valid ones: job cards, fabrication drawings, data sheets, assembly drawings, repair & maintenance diagram, risk assessment.