



Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold the flap and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.

1	Student Number	2410530
2	Title of Examination Paper	ACDA 5006 Transducers and Signal Conditioning
3	Module Code	ACDA 5006
4	Date and Time of Examination	7/1/25 15:00
5	Examination Venue	IQ 103
6	Seat Number	38
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	6 ✓
2	6 ✓
3	8 ✓
4	3 ✓
5	5 ✓
6	5 ✓
Total	33 ✓

$$\frac{33}{50} \times 100 = 66\%$$

1)

it is essential that all test equipment and measuring equipment are calibrated to a known standard, this is to ensure the measurements given are accurate. When test and measurement equipment is purchased it will have been calibrated by the manufacturer. Over time the sensitivity and zero point may drift. So it is important that equipment is recalibrated regularly. The frequency of calibration will depend on accuracy required or Certification needed. If you have test equipment for a high precision workplace such as a factory that produces aeroplane parts, the equipment would need to be calibrated more often than a toy factory test equipment. If for example you had a device that measured emissions in an area and would deem the area as safe or unsafe environment, this would need to be calibrated frequently to avoid an unsafe area being deemed safe.

G.

✓

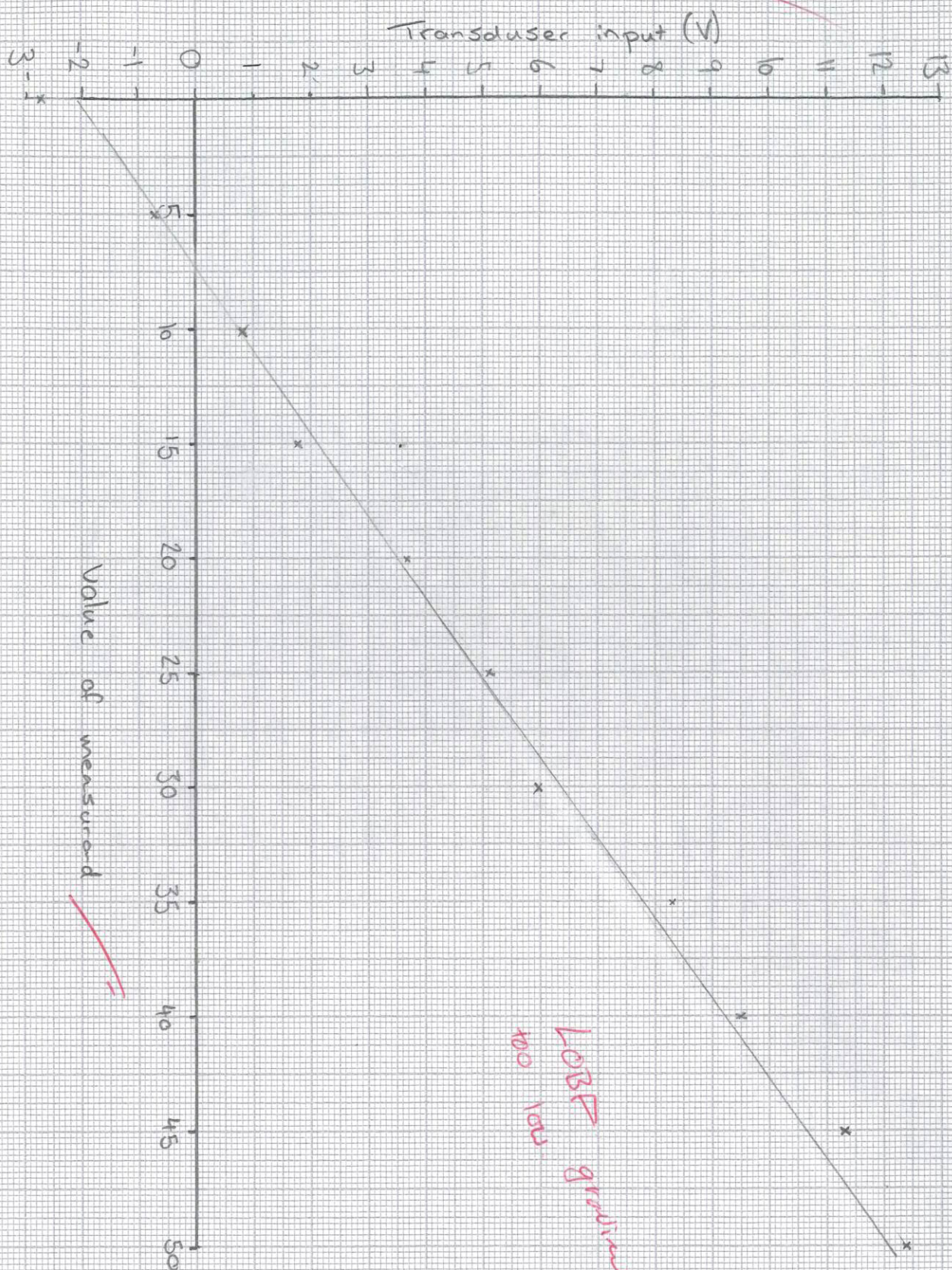
2a Over voltage protection

2b Over voltage protection is use in Circuits to prevent Voltages that exsede the operating voltage, as it could damage the Circuit.

D1 - D2 are Zenner diodes which are in reverse polarity. This is to set the range of Voltage that is permitted to enter the Circuit. If high Voltage which is higher ~~to~~ than the Zenner diode values the Voltage ~~will be~~ Zenner diode will conduct and will be sent to ground.

R₁ is to ~~prevent high~~ limit the current that enters the Circuit, this value ~~will~~ for the resistor will depend on the ~~current~~ operating current for the circuit. high current will damage the components in the Circuit.

2410530



3

3a refere to graph paper

(3)

3b the max nonlinearity is at 45 and is around 0.6

$$0.6/12 \times 100 = 5\%$$

error carried forward

(2)

~~50/12~~ $\frac{12}{50} = 0.24$

~~zero offset~~

~~0.24~~

3c Sensitivity = $\frac{12 - -2}{50} = 0.29$

(1)

3d Zero offset = $0 - 2.71 = -2.71$

(2)

4)

4a the flow sensor for the amount of chlorine added to drinking water would need to have a high precision working in a range of $\pm 1\%$ due to the safety risk if too much chlorine is added, it would also be beneficial to have a back up flow sensor in case the first failed. This would need regular calibration to avoid drift.

4b the flow sensor for a smart meter would not need to be as accurate as the flow sensor for the chlorine flow due to the decreased safety risk. the meter allows an estimate for how much the consumer is going to pay, a range of $\pm 10\%$ would seem acceptable in this case. it also would require as much calibration

3

5

random errors ~~etc~~ can occur due to a change in the tests environment and can be caused by noise.

Systematic errors can occur due to changes in the equipment such as sensitivity drift

S

6) accuracy can be defined by the closeness of the output reading to a known true value.

precision can be defined by the degree of freedom from random errors.

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