

INSTRUCTION:

This section consists of FOUR (4) structure questions. Answer ALL questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan struktur. Jawab SEMUA soalan.

QUESTION 1

SOALAN 1

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|-------------|---|-----------------------------------|
| CLO 1
C1 | <p>(a) (i) Define calibration in instrumentation.
<i>Definisikan penentukuran dalam instrumentasi.</i></p> | <p>[2 marks]
[2 markah]</p> |
| | <p>(ii) State TWO (2) significance of calibration in instrumentation.
<i>Nyatakan DUA (2) kepentingan penentukuran dalam peralatan.</i></p> | <p>[4 marks]
[4 markah]</p> |
| CLO 1
C2 | <p>(b) (i) Explain the difference between instrumental and environmental errors. State TWO (2) examples for each error above.
<i>Huraikan perbezaan di antara ralat peralatan dan ralat persekitaran.
Berikan DUA (2) contoh bagi ralat di atas.</i></p> | <p>[6 marks]
[6 markah]</p> |
| | <p>(ii) Describe THREE (3) methods to avoid environmental errors in measurement.
<i>Huraikan TIGA (3) kaedah bagi mengatasi ralat persekitaran dalam pengukuran.</i></p> | <p>[3 marks]
[3 markah]</p> |
| CLO 2
C3 | <p>(c) Illustrate the principle operation of a micro manometer used in pressure measurement with a detailed explanation.
<i>Gambarkan prinsip operasi bagi mikro manometer yang digunakan dalam pengukuran tekanan dengan penerangan yang jelas.</i></p> | <p>[10 marks]
[10 markah]</p> |

QUESTION 2

SOALAN 2

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|-------------|---|--|
| CLO 2
C1 | <p>(a) List FOUR (4) instrumentations with indirect levels sensing in level measurement.</p> | |
|-------------|---|--|

- Senaraikan EMPAT (4) peralatan bagi pengukuran paras bendalir jenis tak terus.* [4 marks]
[4 markah]
- CLO 2 (b) Explain the principle operation and construction of sight glass gauge.
C2 *Terangkan prinsip operasi dan binaan bagi tolok kaca penglihatan.* [8 marks]
[8 markah]
- CLO 2 (c) With an aid of a labeled diagram, explain the principle operation of
C3 capacitance in level sensing. List TWO (2) advantages and TWO (2) disadvantages of capacitance level measurement.
Dengan bantuan gambarajah, jelaskan prinsip operasi bagi kapasitans dalam pengukuran paras. Senaraikan DUA (2) kelebihan dan DUA (2) kelemahan pengukuran bendalir jenis kapasitan. [13 marks]
[13 markah]
- QUESTION 3**
SOALAN 3
- CLO 2 (a) Draw and label a pitot tube complete with the stagnation pressure, P_o ,
C1 and static pressure, P_s .
Lukis dan labelkan tiub pitot bersama dengan tekanan stagnasi, P_o dan tekanan statik, P_s . [5 marks]
[5 markah]
- CLO 2 (b) Describe the principle operation of the Ultrasonic transit-time flowmeter
C2 with a suitable diagram.
Terangkan prinsip operasi bagi meter alir Ultrasonik anjakan masa bersama lakaran rajah yang sesuai. [8 marks]
[8 markah]
- CLO2 (c) There are various types of Positive Displacement flow meters. One of
C3 them is commonly used in the applications of residential water meters around the world. Name the meter mentioned above and explain the design of this flowmeter with its operational function.
Terdapat pelbagai jenis meter alir Anjakan Positif. Salah satu daripadanya sering digunakan di dalam aplikasi meter air kediaman di seluruh dunia. Namakan meter yang dinyatakan di atas dan terangkan rekabentuk bagi meter alir ini bersama fungsi operasi. [12 marks]
[12 markah]

QUESTION 4**SOALAN 4**CLO 2
C1

- (a) (i) Name **TWO (2)** temperature transducers that applied the resistance changes in thermal measurements.

Namakan DUA (2) transduser suhu yang mengaplikasikan perubahan rintangan dalam pengukuran suhu. [2 marks]
[2 markah]

- (ii) Give the type of signal that is produced by thermocouple.

Berikan jenis isyarat keluaran bagi termogandingan [2 marks]
[2 markah]

CLO2
C2

- (b) Filled system thermometer is commonly disturbed by sources of error from the environment factor. Discuss the sources of error that might occur in the filled system of thermometer for temperature measurement.

Termometer terisi lazimnya diganggu dengan ralat yang berpunca dari faktor persekitaran. Bincangkan ralat-ralat yang mungkin terjadi dalam pengukuran suhu yang melibatkan termometer terisi. [8 marks]
[8 markah]

CLO2
C3

- (c) Illustrate the principle operation of the Thermocouple with a detailed explanation. Give **TWO (2)** advantages and **TWO (2)** disadvantages of this meter.

Ilustrasikan prinsip operasi bagi Termogandingan bersama penjelasan yang terperinci. Berikan DUA(2) kelebihan dan DUA(2) kelemahan bagi meter ini. [13 marks]
[13 markah]

SOALAN TAMAT