

SECTION A : 20 MARKS
BAHAGIAN A : 20 MARKAH

INSTRUCTION :

This section consists of **TWENTY (20)** objective questions. Mark your answers in the OMR form provided.

ARAHAN :

Bahagian ini mengandungi DUA PULUH (20) soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.

CLO1
C1

1. A _____ is the device that converts one form of energy to another form.
 _____ adalah peranti yang menukarkan satu bentuk tenaga kepada bentuk yang lain.

- A. Sensor
Penderia
- B. Transmitter
Pemancar
- C. Transducer
Transduser
- D. Thermocouple
Pengganding termo

CLO1
C2

2. Which of the following sensor is the pressure sensor?
 Antara berikut, yang manakah penderia tekanan?

- A. Strain Gauge
Tolok Regangan
- B. RTD (Resistance Temperature Detector)
RTD (Pengesan Suhu Kerintangan)
- C. LDR (Light Dependent Resistor)
LDR (Perintang Kebergantungan Cahaya)
- D. Thermocouple
Pengganding termo

SULIT

POLITEKNIK
Jabatan Pengajian Politeknik

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
 JABATAN PENGAJIAN POLITEKNIK
 KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI JUN 2013

EJ302 : INSTRUMENTATION

TARIKH : 25 OKTOBER 2013

TEMPOH : 2 JAM (8.30 AM – 10.30 AM)

Kertas ini mengandungi **LAPAN BELAS (18)** halaman bercetak.

Bahagian A: Objektif (20soalan)

Bahagian B: Struktur (10 soalan)

Bahagian C: Esei (2 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

CLO1
C1

5. The _____ systems make use of cylinders (linear motors) and rotary motors, the motion of which is governed by a compressible gas.

Sistem _____ menggunakan silinder (motor linear) atau motor berputar, yang digerakkan oleh tekanan gas.

- A. Hydraulic
Hidraulik
- B. Pneumatic
Pneumatik
- C. Mechanic
Mekanik
- D. Electronic
Elektronik

CLO1
C2

6. The valve which is determine the passage and the flow of the air current by means of appropriate moving parts contained in them actuated from the outside, is:

Injap yang menentukan laluan dan aliran arus udara dengan pergerakan bahagian dalam yang dikawal dari luar ialah:

- A. Directional
Terarah
- B. On - Off
Buka – Tutup
- C. Pressure Regulator
Pengatur Tekanan
- D. Flow-rate Regulator
Pengatur kadar aliran

CLO1
C2

3. The following are the passive transducer EXCEPT:

Berikut ialah transduser jenis pasif, KECUALI:

- A. Strain gauge
Tolok regangan
- B. Thermistor
Termistor
- C. Photoconductive
Fotokonduktif
- D. Piezoelectric
Piezoelektrik

CLO1
C2

4. The resistance of _____ is very high, sometimes as high as 1 000 000 ohms, but when they are illuminated with light, resistance drops dramatically.

Kerintangan _____ adalah sangat tinggi, sehingga mencecah 1 000 000 ohms, tetapi apabila terdedah kepada cahaya, kerintangan boleh jatuh dengan mendadak.

- A. RTD (Resistance Temperature Detector)
RTD (Pengesan Suhu Kerintangan)
- B. LDR (Light Dependent Resistor)
LDR (Perintang Kebergantungan Cahaya)
- C. Humidity sensor
Penderia kelembapan
- D. Piezoelectric
Piezoelectric

CLO1
C1

9. The following are the **TRUE** analogy of hydraulic to electrical equipment **EXCEPT**

Berikut ialah analogi yang BETUL bagi peralatan hidraulik kepada elektrik, KECUALI

- A. Hydraulic pump – Generator
Pam hidraulik - Penjana
- B. Hydraulic motor – Electric motor
Motor hidraulik – motor elektrik
- C. Hoses – Wire
Hos – wayar
- D. Accumulator – Transformer
Akumulator - Transformer

CLO1
C1

10. Named the hydraulic symbol in Figure 10 below.

Namakan simbol hidraulik dalam Rajah A10 di bawah

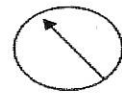


Diagram A10/Rajah A0

- A. Flow meter
Meter aliran
- B. Pressure gauge
Pengukur tekanan
- C. Electric motor
Motor elektrik
- D. Pump
Pam

CLO1
C2

7. Identify the symbol in Diagram A7 below.

Kenalpasti simbol dalam Rajah A7 di bawah.

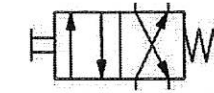


Diagram A7/ Rajah A7

- A. Valve 2/2 way
Injap 2/2 hala
- B. Valve 3/2 way
Injap 3/2 hala
- C. Valve 4/2 way
Injap 4/2 hala
- D. Valve 5/2 way
Injap 5/2 hala

CLO1
C2

8. The _____ allows pressure changes in the shortest time especially when using computerized control units with flow rate.

_____ membenarkan perubahan tekanan dalam masa yang singkat terutamanya semasa menggunakan kawalan kadar aliran berkomputer.

- A. Flow control valve
Injap kawalan aliran
- B. Uni-directional valve
Injap berarah tunggal
- C. Pressure relief valve
Injap bantuan tekanan
- D. Pressure control valve
Injap kawalan tekanan

CLO1
C2

13. The following statements below are **TRUE** about the component in control valve **EXCEPT**

Pernyataan berikut adalah BETUL mengenai komponen dalam injap kawalan KECUALI

- A. Valve – maintain the process parameter such as pressure, flow, temperature or level at their desired values.
Injap - mengekalkan parameter proses seperti tekanan, aliran, suhu, atau tahap pada nilai yang dikehendaki.
- B. Actuator – a device that responds to an applied instrument signal by creating a linear or rotational motion.
Penggalak - alat yang memberi respons kepada isyarat instrumen yang digunakan dengan menghasilkan gerakan linear atau putaran.
- C. Butterfly valve – a valve which can be used for isolating or regulating flow.
Injap Rama-rama - injap yang boleh digunakan untuk mengasingkan atau mengawal aliran.
- D. Positioned – a positioned ensures that there is linear relationship between the signal output pressure from the control system and the position of the control valve.
Kedudukan - memastikan terdapat hubungan linear antara isyarat tekanan output dari sistem kawalan dan kedudukan injap kawalan.

CLO1
C1

11. Hydraulic and _____ are analogous, because they both deal with flow, pressure and load.

Hidraulik dan _____ adalah hampir sama, kerana keduanya melibatkan aliran, tekanan dan bebanan.

- A. Mechanic
Mekanik
- B. Electric
Elektrik
- C. Kinetic
Kinetik
- D. Digital
Digital

CLO1
C2

12. Identify the electrical equipment which its function is similar to directional control valve in hydraulic.

Kenalpasti peralatan elektrik yang mempunyai fungsi yang sama dengan injap kawalan terarah

- A. Generator
Penjana
- B. Capacitor
Kapasitor
- C. Switches
Suis
- D. Inductor
Peraruh

CLO1
C1

16. The following are the main components in control valve, **EXCEPT**:
Berikut adalah komponen utama dalam injap kawalan, KECUALI:

- A. Actuator
Penggalak
- B. Switches
Suis
- C. Positioned
Kedudukan
- D. Stem
Batang

CLO1
C1

17. Named the symbol in the Diagram A17 below.
Namakan simbol dalam Rajah A17 di bawah.

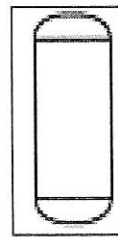


Diagram A17/Rajah A17

- A. Tank
Tangki
- B. Bin
Tong
- C. Drum
Dram
- D. Tower
Menara

CLO1
C2

14. Identify the correct statement about the operations of pressure to current converter.
Kenalpasti pernyataan yang BETUL mengenai operasi penukar tekanan kepada arus.

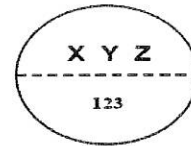
- A. Pressure to current converter needs when output pneumatic controller signal is used to transmit signal to an electronic controller or to replace output pneumatic signal in order to approach electric control valve.
Penukar tekanan kepada arus perlu apabila isyarat output pengawal pneumatik menghantar isyarat kepada pengawal elektronik atau untuk menggantikan isyarat output pengawal pneumatik apabila menggunakan injap kawalan elektrik.
- B. A "current to pressure" converter (I/P) converts an analog signal (4 to 20 mA) to a proportional linear pneumatic output.
Penukar "Arus kepada tekanan" (I / P) menukarkan isyarat analog (4 ke 20 mA) kepada output pneumatik berkadar linear.
- C. The input current flows in the coil and produces magnetic field to the surrounding area.
Input arus mengalir dalam gegelung dan menghasilkan medan magnet untuk kawasan sekitarnya.
- D. Magnet field effects will respond to the magnet and produce torque.
Kesan medan magnet akan bertindak balas terhadap magnet dan menghasilkan daya kilas.

CLO1
C1

15. In general terms, converter converts
Secara umum, penukar menukar
- A. Flow to pressure energy
Aliran kepada tenaga tekanan
 - B. Pneumatic output into analogue signal
Output Pneumatik kepada isyarat analog
 - C. Electronic energy into other forms of energy
Tenaga elektronik kepada bentuk tenaga lain
 - D. Pressure energy to analogue signal
Tenaga tekanan kepada isyarat analog

CLO1
C1

20. The line in the symbol in Diagram A20 below means
- Garisan dalam simbol pada Rajah A20 di bawah, bermaksud*



No Line
Diagram A20/Rajah A20

- A. The instrument is mounted in the field near the process.
Instrumen diletak berhampiran dengan proses
- B. The instrument is mounted in the control room.
Instrumen diletak didalam bilik kawalan
- C. The instrument is mounted outside the control room.
Instrumen diletak diluar bilik kawalan
- D. The instrument is mounted out of sight
Instrumen diletak diluar pandangan

CLO1
C1

18. Choose the correct purpose of P&ID
- Pilih pernyataan yang tepat mengenai P&ID*

- i. Provide field construction and inspection personnel ready reference to ensure all equipment, instrumentation, piping, etc is properly located and interrelated
Menyediakan rujukan kepada kakitangan bagi pembinaan dan pemeriksaan untuk memastikan semua peralatan, instrumentasi, paip, dll diletak dengan betul dan saling berhubung
- ii. Enable the engineer contractor to make a complete mechanical equipment, instrument, valve and controller take-off which is the basic element for definite bid
Membolehkan jurutera kontraktor untuk menyediakan peralatan mekanikal, alat, injap dan kawalan pelepasan yang merupakan elemen asas untuk tawaran yang pasti
- iii. Provide a quick snapshot of the operating unit
Memberi gambaran yang cepat mengenai unit operasi
- iv. Useful for visitor information and new employee training.
Berguna untuk maklumat pengunjung dan latihan pekerja baru.
- A. I and II
B. III and IV
C. I, II, III, and IV
D. I, II, and III

19. Identify the P&ID symbol for pneumatic gate valve.

Kenalpasti simbol P&ID yang betul bagi injap pintu pneumatic.

- A.
- B.
- C.
- D.

CLO1
C1

CLO1
C1 **QUESTION 5**
Definition of hydraulics system

SOALAN 5
Definisikan sistem hidraulik

[3 marks]
[3 markah]

CLO1
C2 **QUESTION 6**
Explain briefly about the Pascal's Law in hydraulic.

SOALAN 6
Terangkan dengan ringkas mengenai Hukum Pascal dalam hidraulik.

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 7**
Definition of transmitter

SOALAN 7
Definisi pemancar

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 8**
List **THREE(3)** examples of rotary valve

SOALAN 8
Senaraikan TIGA(3) contoh injap berputar

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 9**
Complete label I, II and III for indicator instrument and controller below.

SOALAN 9
Lengkapkan label I, II dan III bagi instrumen indicator dan kawalan di bawah.

[3 marks]
[3 markah]

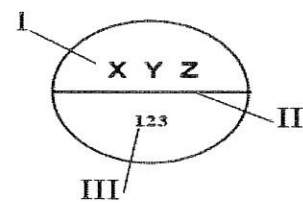


Diagram B9/Rajah B9

SECTION B : 30 MARKS
BAHAGIAN B : 30 MARKAH

INSTRUCTION:
This section consists of **TEN (10)** structured questions. Answer **ALL** questions.

ARAHAN:
Bahagian ini mengandungi SEPULUH (10) soalan berstruktur. Jawab semua soalan.

CLO1
C1 **QUESTION 1**
Draw the block diagram of basic instrumentation system.

SOALAN 1
Lukiskan rajah blok asas bagi sistem pengalatan.

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 2**
Differentiate passive and active transducer.

SOALAN 2
Bezakan transduser pasif dan transduser aktif.

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 3**
Definition of pneumatic.

SOALAN 3
Definisi pneumatik

[3 marks]
[3 markah]

CLO1
C1 **QUESTION 4**
List **THREE(3)** application of pneumatic in rail industry

SOALAN 4
Senaraikan TIGA(3) aplikasi pneumatic dalam industri kereta api.

[3 marks]
[3 markah]

SECTION C : 50 MARKS
BAHAGIAN C : 50 MARKAH

INSTRUCTION:

This section consists of **TWO(2)** essay questions. Answer **ALL** questions

ARAHAN:

Bahagian ini mengandungi **DUA(2)** soalan esei. Jawab **semua soalan**.

CLO1
C2

QUESTION 1

SOALAN 1

- a. List **THREE(3)** advantages of hydraulic system.
*Senaraikan **TIGA(3)** kelebihan system hidraulik.*

[3 marks]
[3 markah]

- b. Diagram C1 shows the light sensor circuit. Explain the operation of the circuit

Rajah C1 menunjukkan litar penderia cahaya. Terangkan operasi litar.

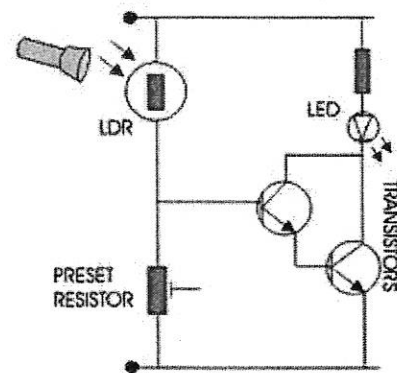


Diagram C1/Rajah C1

[5 marks]
[5 markah]

CLO1
C2

- c. List down **FOUR(4)** type of valves classification. Briefly describe each of them.

*Senaraikan **EMPAT(4)** jenis klasifikasi injap dan terangkan setiap satu.*

[8 marks]
[8 markah]

CLO1
C1

QUESTION 10

Named the P&ID symbol below.

SOALAN 10

Namakan simbol P&ID berikut



[3 marks]
[3 markah]

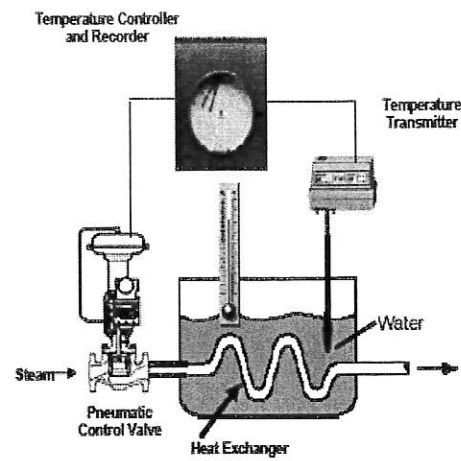


Diagram C1/ Rajah C1

- d. Process Diagram is divided into two major categories such as Process Flow Diagram (PFD) and Process and Instrumentation Diagram (P&ID). Describe THREE (3) differences between PFD and P&ID.

Rajah Proses terdiri daripada dua kategori iaitu Rajah Aliran Proses dan Rajah Perpaipan dan Pengalatan. Huraikan TIGA (3) perbezaan antara keduanya.

[6 marks]
[6 markah]

SOALAN TAMAT

CLO1
C2

- d. Explain the **THREE (3)** main segments in the hydraulic system with including the basic block diagram.

Terangkan TIGA(3) segmen utama dalam sistem hidraulik beserta dengan gambarajah blok asas.

[9 marks]
[9 markah]

QUESTION 2

CLO1
C2

SOALAN 2

- a. Define the terms below:
i. Accumulator
ii. Actuator

Definisikan istilah berikut:

- i. Akumular
ii. Penggalak

[3 marks]
[3 markah]

- b. List **FOUR(4)** main parts in the control valve and explain each of the part.

Senaraikan EMPAT(4) bahagian utama dalam injap kawalan dan terangkan setiap satu.

[8 marks]
[8 markah]

CLO1
C1

- c. Draw a Piping and Instrumentation Diagram (P&ID) for the diagram below

Lukiskan Piping and Instrumentation Diagram (P&ID) bagi Rajah dibawah

[8 marks]
[8 markah]