SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN PETROKIMIA

PEPERIKSAAN AKHIR

SESI DISEMBER 2018

DGP2062: PIPING AND INSTRUMENTATION DIAGRAM

TARIKH : 22 APRIL 2019
MASA : 11.15 PAGI – 1.15 TENGAHARI (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : APPENDIX 1 & 2

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

INSTRUCTION:
This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO1
C1

a) Draw the process line symbol below:
Lukiskan simbol aliran proses di bawah:

i. Steam traced line [1 Mark]
"Steam traced line" [*1 Markah*]

ii. T-type strainer [1 Mark]
Penapis jenis T [*1 Markah*]

iii. Spectacle blind [1 Mark]
"Spectacle blind" [*1 Markah*]

iv. Reducer [1 Mark]
"Reducer" [*1 Markah*]

CLO1
C2

b) Sketch each instrumentation tag symbol to differentiate between:
Lakarkan setiap simbol tag instrumentasi untuk membezakan antara:

i. main board mounted and mounted behind board for level indicator interface at loop number 115.
"main board mounted dan mounted behind board" bagi antara muka penunjuk tahap pada nombor loop 115.

[4 Marks]
[*4 Markah*]

ii. locally mounted and locally mounted behind board for flow converter at loop number 1010.
"locally mounted dan locally mounted behind board" bagi penukar aliran pada nombor loop 1010.

[4 Marks]
[*4 Markah*]

CLO1 C2

c) A valve is a mechanical device that controls the flow of fluid and pressure within a system or process. Explain the main difference between a gate valve and a globe valve.

Injap adalah peranti mekanikal yang mengawal aliran bendalir dan tekanan dalam sistem atau proses. Terangkan perbezaan utama antara injap pintu dan injap globe.

[5 Marks]
[*5 Markah*]

CLO1 C3

d)

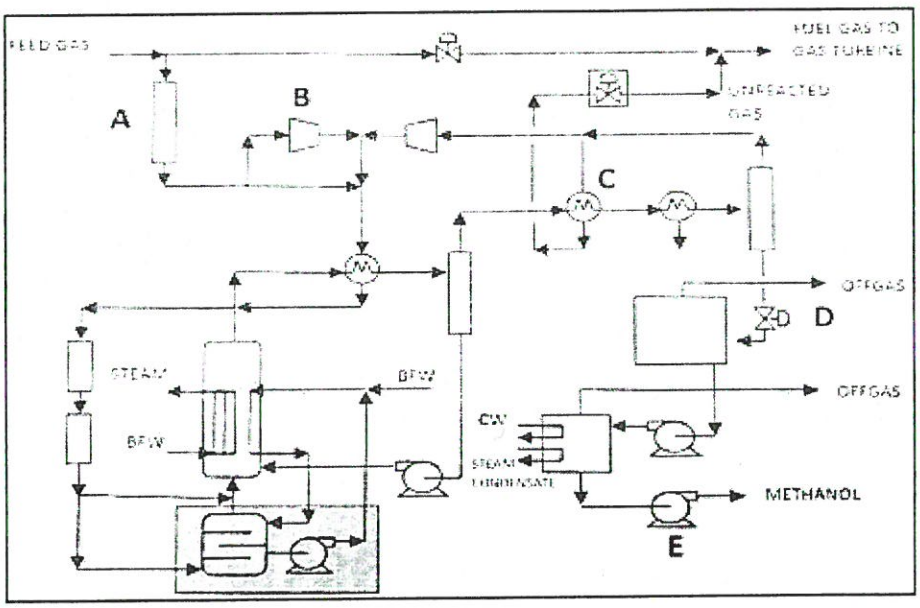


Diagram 1(i): Process Flow Diagram in a petrochemical plant.
Gambar rajah 1(i): Gambar rajah aliran proses di loji petrokimia.

Based on Diagram 1(d), explain the function of the equipment denoted by letter:

Berdasarkan kepada Gambar rajah 1(d), terangkan fungsi perkakasan yang ditandakan dengan huruf:

i. Equipment A. [2 Marks]
Perkakasan A. [2 Markah]

ii. Equipment B. [2 Marks]
Perkakasan B. [*2 Markah*]

iii. Equipment D. [2 Marks]
Perkakasan D. [*2 Markah*]

iv. Equipment E. [2 Marks]
Perkakasan E. [*2 Markah*]

QUESTION 2
SOALAN 2

CLO1
C1

a) A flow diagram is used to show a process, function and equipment used for a specific task. State **TWO (2)** importance of flow diagram.
*Gambar rajah aliran digunakan untuk menunjukkan proses, fungsi dan peralatan yang digunakan untuk kerja tertentu. Nyatakn **DUA (2)** kepentingan gambar rajah aliran.*

[4 Marks]
[*4 Markah*]

CLO1
C2

b) Based on Diagram 2(i) below, explain the process of ethane production as shown in the block flow diagram.
Berdasarkan kepada Gambar rajah 2(i) di bawah, terangkan proses penghasilan etana seperti yang ditunjukkan di dalam gambar rajah aliran blok.

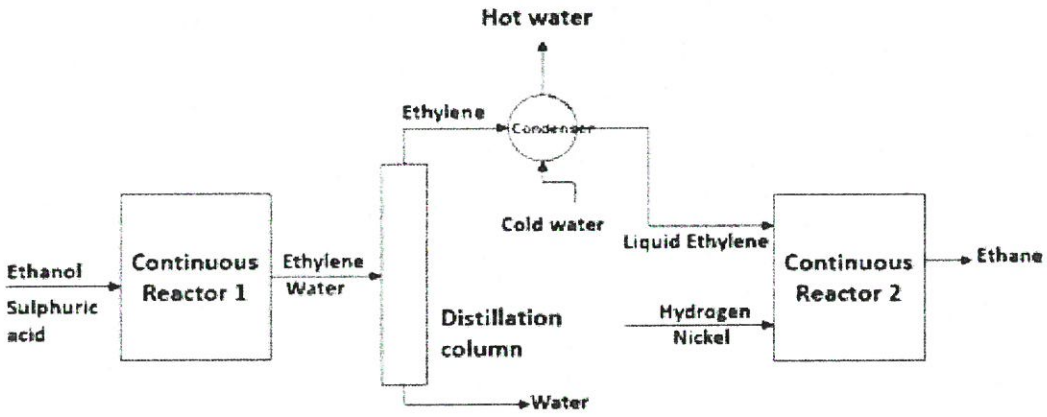


Diagram 2(i): Production of ethane from ethanol.
Gambar rajah 2(i): Penghasilan etana daripada ethanol.

[10 Marks]
[*10 Markah*]

CLO1
C2

c) Piping and Instrumentation Diagram (P&ID) shows all piping including physical sequences of branches, reducers, valves, equipment, instrumentation and control interlocks. Explain the term of piping.

Lukisan pempaipan dan instrumentasi (P&ID) menunjukkan semua paip termasuk urutan fizikal cawangan, pengurang, injap, kelengkapan, peralatan dan kawalan saling kunci. Terangkan terma pempaipan.

[3 Marks]
[*3 Markah*]

CLO1
C3

d) Based on Diagram 2(ii) below, convert the flow diagram to a process flow diagram with complete label.

Berdasarkan kepada Gambar rajah 2(ii) di bawah, tukarkan gambar rajah aliran kepada gambar rajah aliran proses dengan label yang lengkap.

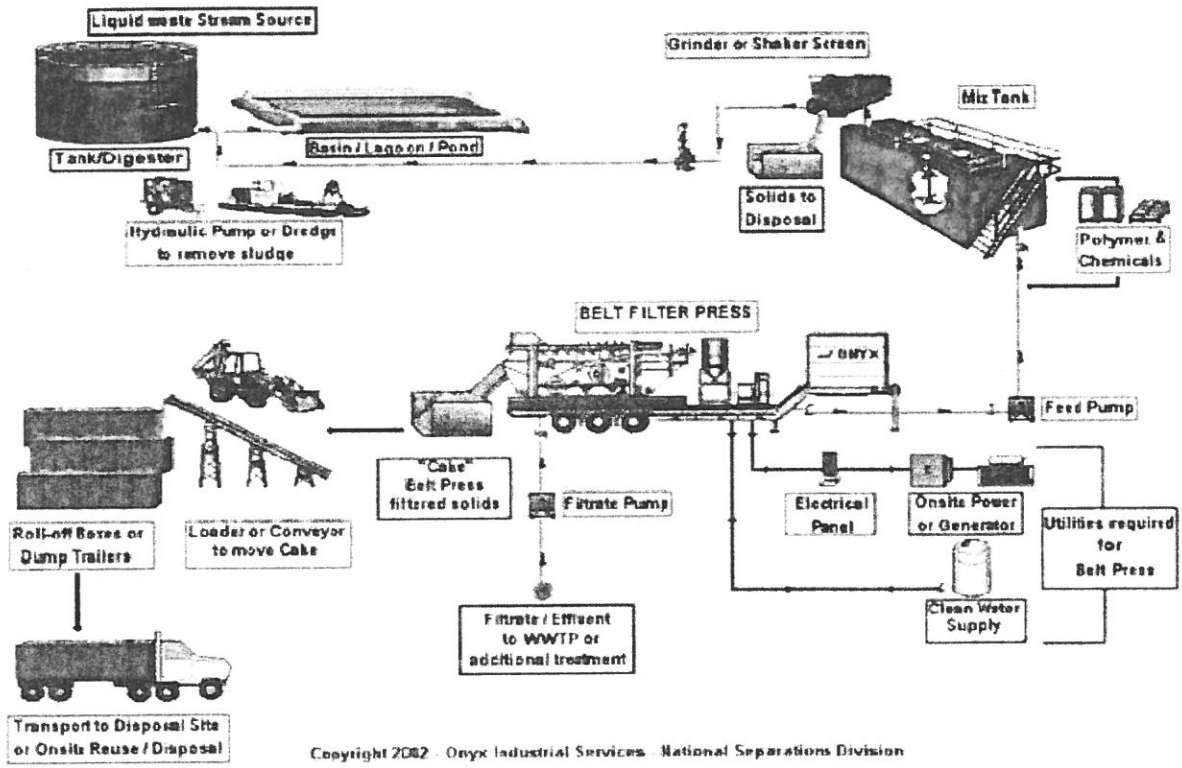


Diagram 2(ii): Wastewater liquid treatment.
Gambar rajah 2(ii): Rawatan sisa cecair.

[8 Marks]
[*8 Markah*]

QUESTION 3
SOALAN 3

CLO2 C1

a) Piping Identification System (PIS) consists of five sections known as fluid code, pipe diameter size, piping material specification, unit number, line number and insulation type. Name the abbreviation letter below:

Sistem Pengenalan Perpaipan (PIS) terdiri daripada lima bahagian yang dikenali sebagai kod bendalir, saiz diameter paip, spesifikasi bahan pempaipan, nombor unit, nombor garis dan jenis penebat. Namakan singkatan perkataan di bawah:

i. SH. [1 Mark]
SH. [*1 Markah*]

ii. ST. [1 Mark]
ST. [*1 Markah*]

iii. TW. [1 Mark]
TW. [*1 Markah*]

iv. UW. [1 Mark]
UW. [*1 Markah*]

CLO2 C2

b) AC-4"-W1A1-01029-P-50

Explain each code in the Piping Identification System (PIS) above.
Terangkan setiap kod dalam Sistem Pengenalan Perpaipan (PIS) di atas.

[7 Marks]
[7 *Markah*]

CLO2 C2

c) At one of the pipelines in a urea plant, it is found that the pipeline is stated as CWS-2"-1P2-02066. Explain the Piping Identification System (PIS) for the plant.

Pada salah satu garisan paip di loji urea, didapati bahawa garisan paip dinyatakan sebagai CWS-2 "-1P2-02066. Terangkan Sistem Pengenalan Perpaipan (PIS) untuk loji itu.

[5 Marks]
[5 *Markah*]

CLO2 C3

d) By referring to the attachment of Appendix 1, interpret all the Piping Identification System for loop 62 – D – 0105, 62 – D – 0114, and 53 – D – 1301.

Dengan merujuk kepada Lampiran 1, interpretasi semua Sistem Pengenalan Paip bagi gegelung 62 – D – 0105, 62 – D – 0114, dan 53 – D – 1301.

[9 Marks]
[*9 Markah*]

QUESTION 4
SOALAN 4

CLO2 C1

a) A feedback control system is used to control liquid level in a tank with inlet flow rate, F_1 and outlet flow rate, F_2 using all locally mounted basic instrumentation and are electrically actuated. The final element control is a pneumatically control valve. The control loop for the control system numbered as 115. Based on Diagram 4(a) below, identify the controlled variable, measured variable and disturbance for this system.

Sistem kawalan umpan balik digunakan untuk mengawal paras cecair dalam tangki dengan kadar aliran masuk, F_1 dan kadar aliran keluar, F_2 menggunakan semua instrumentasi asas yang dipasang secara tempatan dan digerakkan secara elektrik. Kawalan unsur terakhir adalah injap kawalan pneumatik. Gelung kawalan untuk sistem kawalan bernombor 115. Berdasarkan kepada Gambar rajah 4(a) di bawah, kenal pasti pembolehubah terkawal, pembolehubah ukuran dan gangguan yang diukur untuk sistem ini.

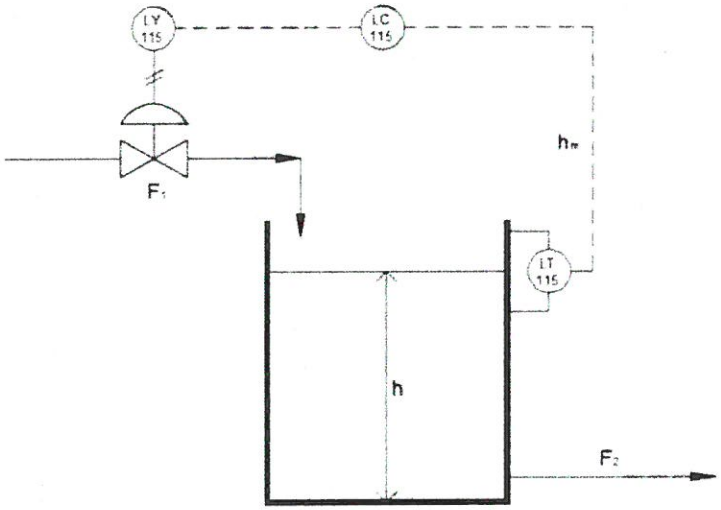


Diagram 4(i): Feedback control system with the inlet flow is manipulated.
Gambarrajah 4(i): Sistem kawalan maklum balas dengan aliran masuk dimanipulasi.

[3 Marks]
[*3 Markah*]

CLO2 C2

b) Cascade control uses the output of the primary controller to manipulate the set point of the secondary controller as if it were the final control element. Explain the **THREE (3)** requirements for cascade control.

Kawalan cascade menggunakan output pengawal utama untuk memanipulasi titik set pengawal menengah seolah-olah ia adalah elemen kawalan akhir. Terangkan **TIGA (3)** keperluan kawalan lata.

[5 Marks]
[*5 Markah*]

The following questions are based on the flow diagram given in Appendix 2.
Soalan berikut adalah berdasarkan kepada gambar rajah aliran proses dalam Appendix 2.

CLO2 C2

c) At the equipment T-100, interpret the:
Pada perkakasan T-100,

i. Name of the equipment. [1 Mark]
Namakan peralatan. [*1 Markah*]

ii. Size of the equipment. [1 Mark]
Saiz peralatan. [*1 Markah*]

iii. Pressure of the equipment. [1 Mark]
Tekanan peralatan. [*1 Markah*]

iv. Temperature of the equipment. [1 Mark]
Suhu peralatan. [*1 Markah*]

v. Insulation type of the equipment. [1 Mark]
Jenis penebat haba bagi peralatan tersebut. [*1 Markah*]

CLO2
C3

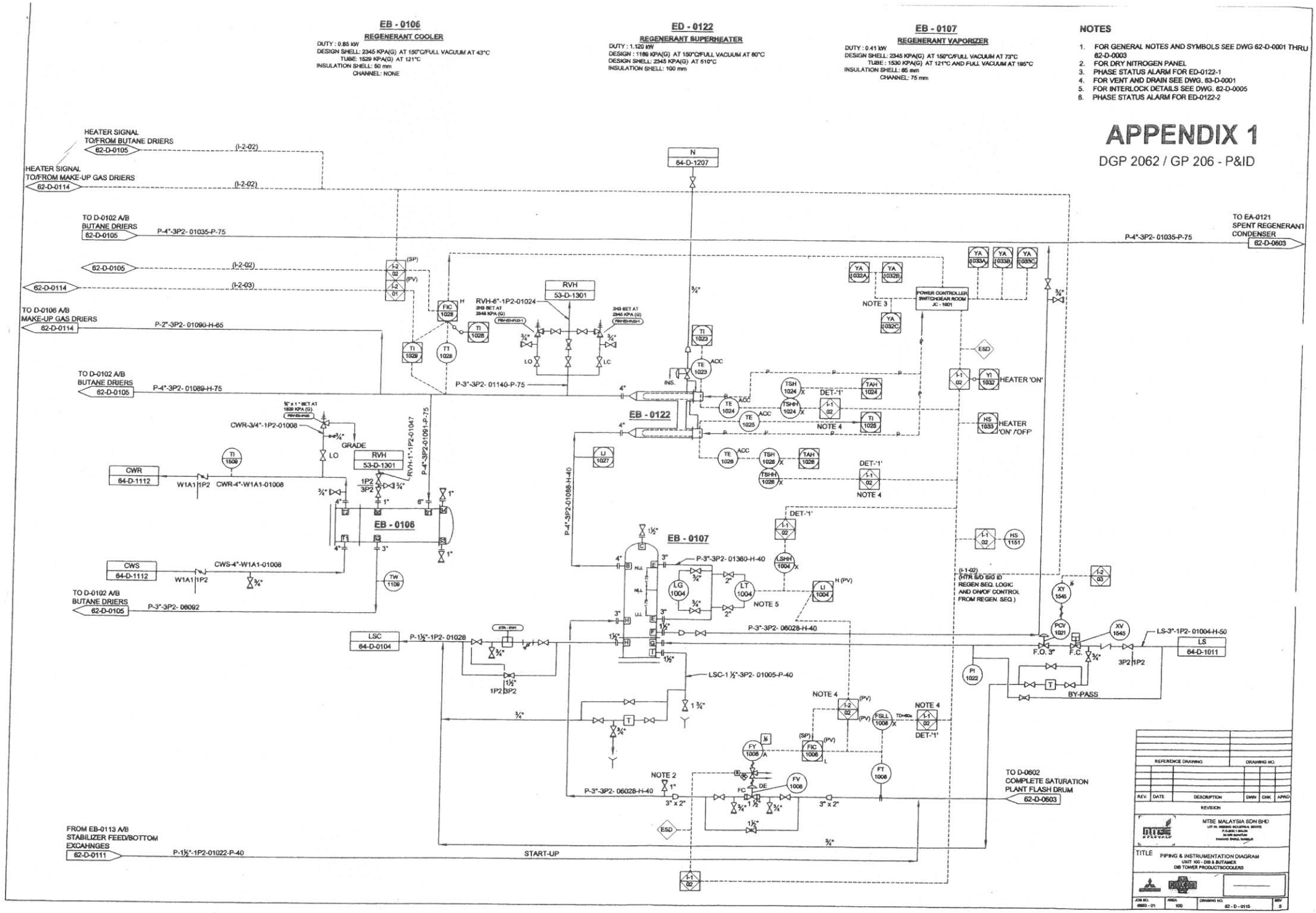
d) By referring to Appendix 2:
Dengan merujuk kepada Appendix 2:

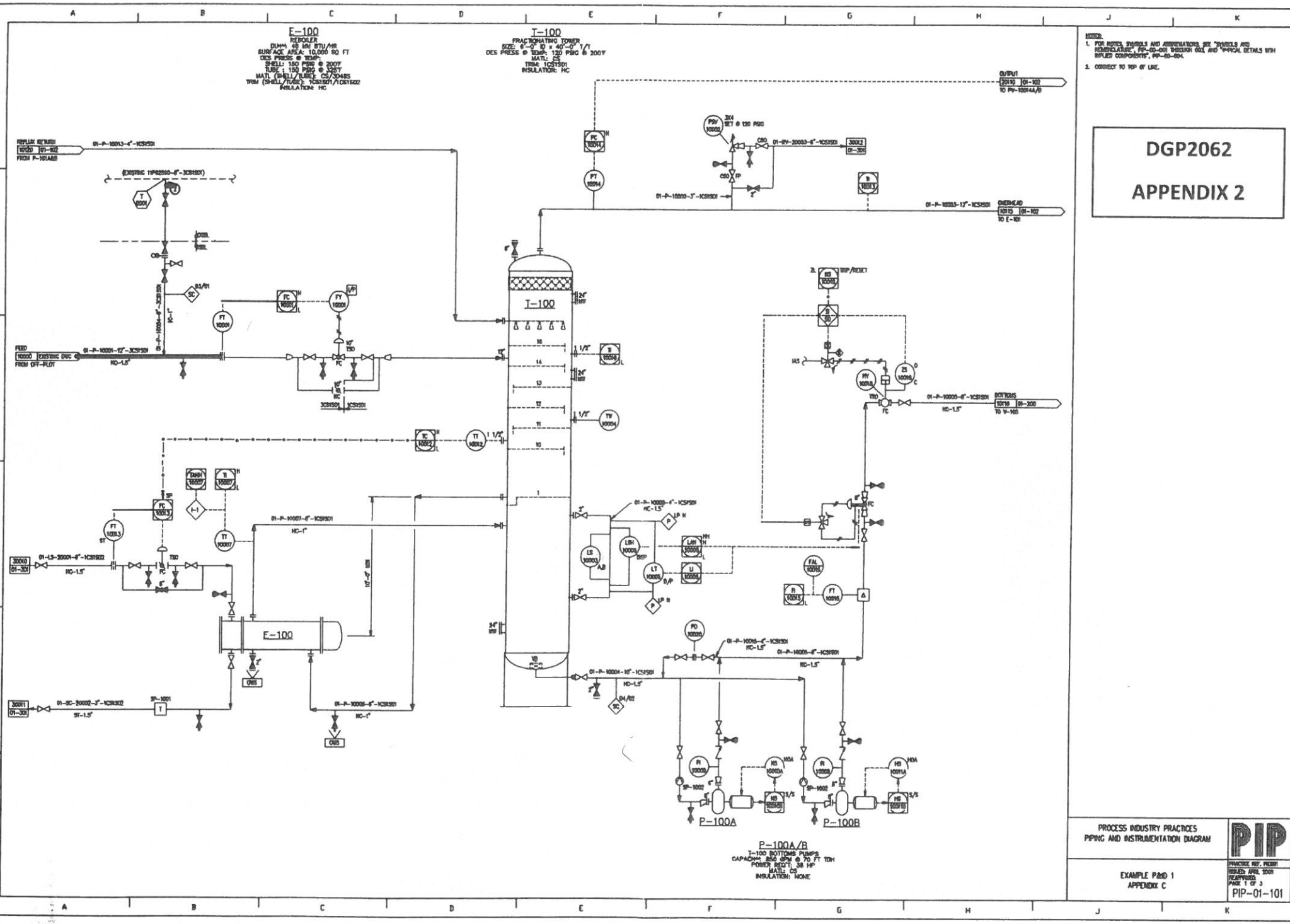
i. Interpret the type of the control system at loop 10001. [2 Marks]
Tafsirkan jenis sistem kawalan pada gegelung 10001. [*2 Markah*]

ii. Interpret the type of the instrument at loop 10006. [8 Marks]
Tafsirkan jenis peralatan yang digunakan pada gegelung 10006.
[*8 Markah*]

iii. Describe the function of equipment P-100A/B. [2 Marks]
Huraikan fungsi bagi peralatan P-100A/B. [*2 Markah*]

SOALAN TAMAT


EB - 0106
REGENERANT COOLER
DUTY : 0.85 kW
DESIGN SHELL: 2345 KPA(G) AT 150°C/FULL VACUUM AT 43°C
TUBE: 1529 KPA(G) AT 121°C
INSULATION SHELL: 50 mm
CHANNEL: NONE
ED - 0122
REGENERANT SUPERHEATER
DUTY : 1.120 kW
DESIGN : 1189 KPA(G) AT 150°C/FULL VACUUM AT 80°C
DESIGN SHELL: 2345 KPA(G) AT 510°C
INSULATION SHELL: 100 mm
EB - 0107
REGENERANT VAPORIZER
DUTY : 0.41 kW
DESIGN SHELL: 2345 KPA(G) AT 150°C/FULL VACUUM AT 73°C
TUBE : 1530 KPA(G) AT 121°C AND FULL VACUUM AT 195°C
INSULATION SHELL: 65 mm
CHANNEL: 75 mm
NOTES
1. FOR GENERAL NOTES AND SYMBOLS SEE DWG 62-D-0001 THRU 62-D-0003
2. FOR DRY NITROGEN PANEL
3. PHASE STATUS ALARM FOR ED-0122-1
4. FOR VENT AND DRAIN SEE DWG. 63-D-0001
5. FOR INTERLOCK DETAILS SEE DWG. 62-D-0005
6. PHASE STATUS ALARM FOR ED-0122-2
APPENDIX 1
DGP 2062 / GP 206 - P&ID
HEATER SIGNAL TO/FROM BUTANE DRIERS 62-D-0105
HEATER SIGNAL TO/FROM MAKE-UP GAS DRIERS 62-D-0114
N 64-D-1207
TO D-0102 A/B BUTANE DRIERS 62-D-0105
TO D-0106 A/B MAKE-UP GAS DRIERS 62-D-0114
TO EA-0121 SPENT REGENERANT CONDENSER 62-D-0603
P-4"-3P2- 01035-P-75
P-2"-3P2- 01090-H-65
P-4"-3P2- 01089-H-75
P-3"-3P2- 01140-P-75
CWR-3/4"-1P2-01008
CWR-4"-W1A1-01008
CWS-4"-W1A1-01008
P-3"-3P2- 06092
P-3"-3P2- 01360-H-40
P-3"-3P2- 06028-H-40
LSC-1 ½"-3P2- 01005-P-40
P-1½"-1P2- 01028
LS-3"-1P2- 01004-H-50
P-1½"-1P2-01022-P-40
START-UP
TO D-0602 COMPLETE SATURATION PLANT FLASH DRUM 62-D-0603
FROM EB-0113 A/B STABILIZER FEED/BOTTOM EXCAHNGES 62-D-0111
RVH 53-D-1301
CWR 64-D-1112
CWS 64-D-1112
LSC 64-D-0104
LS 64-D-1011
POWER CONTROLLER SWITCHGEAR ROOM JC - 1601
HEATER 'ON'
HEATER 'ON' /'OFF'
REGEN SEQ. LOGIC AND ON/OF CONTROL FROM REGEN. SEQ.)
BY-PASS
NOTE 2
NOTE 3
NOTE 4
NOTE 5
REFERENCE DRAWING
DRAWING NO.
REV. DATE DESCRIPTION DWN CHK APPD
REVISION
MTBE MALAYSIA SDN BHD
TITLE PIPING & INSTRUMENTATION DIAGRAM
UNIT 100 - DIB & BUTAMER
DIB TOWER PRODUCT/COOLERS
JOB NO. 6803 - 01
AREA 100
DRAWING NO. 62 - D - 0115
REV 5



NOTES:

1. FOR NOTES, SYMBOLS AND ABBREVIATIONS SEE "SYMBOLS AND NOMENCLATURE", PIP-02-001 VERSION 001 AND "TYPICAL DETAILS WITH INFLUID COMPONENTS", PIP-02-004.
2. CONNECT TO TOP OF LINE.

DGP2062

APPENDIX 2

PROCESS INDUSTRY PRACTICES PIPING AND INSTRUMENTATION DIAGRAM	PIP
EXAMPLE P&ID 1 APPENDIX C	PRACTICE REF. PID001 ISSUED: APRIL 2000 REAFFIRMED PAGE 1 OF 3 PIP-01-101