

**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

- (a) Gas dehydration is one of the important methods in preparing natural gas for sale. Define gas dehydration.

*Pengeringan gas merupakan salah satu kaedah yang penting dalam persediaan untuk penjualan gas asli. Takrifkan pengeringan gas.*

[3 marks]

[3 markah]

CLO1

- (b) Drying natural gas is one of the processes that happen in gas processing plant.

*Pengeringan gas asli merupakan satu proses yang berlaku dalam loji pemprosesan gas.*

- i. Discuss the importance of drying natural gas.

*Bincangkan kepentingan pengeringan gas asli.*

[4 marks]

[4 markah]

- ii. Explain briefly glycol dehydration process that is widely used in the industry.

*Terangkan secara ringkas proses pengeringan glikol yang banyak digunakan dalam industri.*

[4 marks]

[4 markah]

CLO2

- (c) Evaporators can be developed to various types according to the physical characteristics of the processed product.

*Penyejat boleh dibangunkan kepada pelbagai jenis mengikut ciri-ciri fizikal produk yang diproses.*

- i. Diagram 1 (c) shows the long tube vertical evaporator. Complete the diagram labelled A, B, C, D, E and F with correct answers.

*Rajah 1 (c) menunjukkan penyejat menegak dengan tiub panjang. Lengkapkan rajah yang berlabel A, B, C, D, E dan F dengan jawapan yang betul.*

[6 marks]

[6 markah]

- ii. Based on Diagram 1 (c), provide the working principle of the long tube vertical evaporator.

*Berpandukan Rajah 1 (c), berikan prinsip kerja penyejat menegak dengan tiub panjang tersebut.*

[8 marks]

[8 markah]

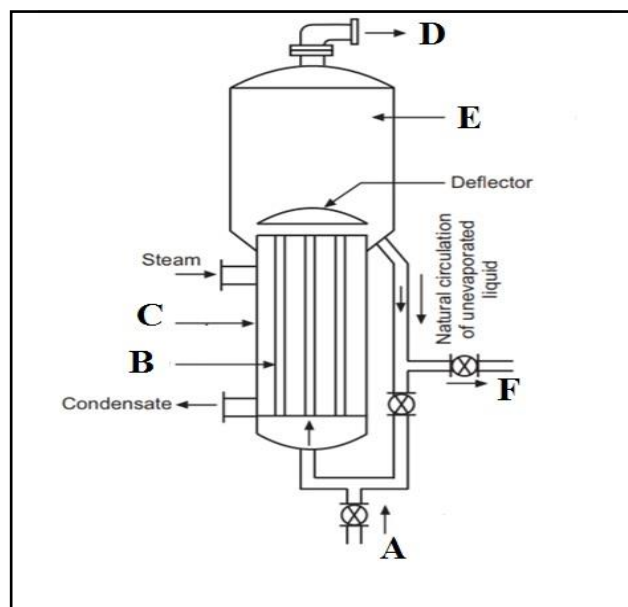


Diagram 1 (c) / Rajah 1 (c)

**QUESTION 2****SOALAN 2**

CLO1

- (a) A change of size or structure of hydrocarbon molecules happens in conversion process. Name **THREE (3)** types of process involved in conversion process.

*Perubahan pada saiz atau struktur molekul hidrokarbon berlaku dalam proses penukaran. Namakan **TIGA (3)** jenis proses yang terlibat dalam proses penukaran.*

[3 marks]

[3 markah]

CLO1

- (b) Catalytic cracking is one of the conversion processes in oil refinery plant.

*Perekahan pemangkin merupakan satu proses penukaran dalam loji penapisan minyak.*

- i. Explain the need to have catalytic cracking unit in oil refinery plant.

*Terangkan perlunya mempunyai unit pemecahan pemangkin dalam loji penapisan minyak.*

[4 marks]

[4 markah]

- ii. Discuss the situation that occurs in reaction chamber of catalytic cracking unit.

*Bincangkan situasi yang berlaku dalam bahagian tindakbalas pada unit pemecahan pemangkin.*

[4 marks]

[4 markah]

CLO2

- (c) There are three important parts in catalytic cracking hardware which are reaction chamber, regenerator and fractionator.

*Terdapat tiga bahagian penting dalam peralatan pemecahan pemangkin iaitu bahagian tindakbalas, penjanaaan semula dan pemecahan.*

- i. Describe the process of regeneration in catalytic cracking unit.

*Terangkan proses bagi penjanaaan semula dalam unit pemecahan pemangkin.*

[6 marks]

[6 markah]

- ii. Complete the process flow diagram of catalytic cracking unit in Figure 2 (c) with the right name of equipment for A, B, C and D.

*Lengkapkan rajah aliran proses unit pemecahan pemangkin dalam Rajah 2 (c) dengan nama yang betul bagi alat A, B, C dan D yang betul.*

[8 marks]

[8 markah]

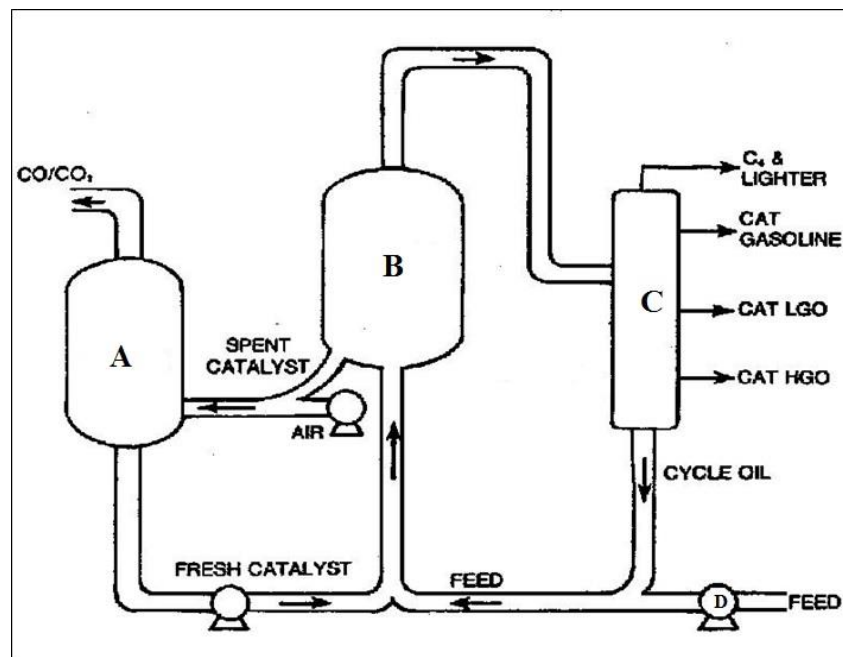


Diagram 2 (c) / Rajah 2 (c)

**QUESTION 3****SOALAN 3**

CLO1

- (a) State **THREE (3)** factors that need to be taken into consideration when designing gas processing plant.

*Nyatakan **TIGA (3)** faktor yang perlu diambilkira semasa merekabentuk loji pemprosesan gas.*

[3 marks]

[3 markah]

CLO1

- (b) Acid Gas Removal Unit (AGRU) is needed to remove sulfur from natural gas.

*'Acid Gas Removal Unit' (AGRU) diperlukan untuk menyingkirkan sulfur dari gas asli.*

- i. State the equipment in Acid Gas Removal Unit (AGRU) which involved in heating and cooling process of the natural gas and adsorption of hydrogen sulfide.

*Nyatakan peralatan dalam Acid Gas Removal Unit (AGRU) yang terlibat dalam proses pemanasan dan penyejukan dan juga penyerapan hidrogen sulfide.*

[4 marks]

[4 markah]

- ii. Acid Gas Removal Unit (AGRU) and Glycol Regeneration Unit (GRU) are two of the five major processing units in gas processing plant. Explain the function of AGRU and GRU.

*'Acid Gas Removal Unit' (AGRU) dan 'Glycol Regeneration Unit' (GRU) merupakan dua daripada lima unit utama dalam loji pemprosesan gas. Terangkan tentang fungsi AGRU dan GRU.*

[4 marks]

[4 markah]

CLO2

- (c) Product Recovery Unit (PRU) is needed to produce propane, butane and condensate from liquid DPCU.

*‘Product Recovery Unit’ (PRU) diperlukan untuk menghasilkan propana, butana dan kondensat dari cecair DPCU.*

- i. Provide the function of the following equipment in Dew Point Control Unit (DPCU) ; knock out drum, gas heat exchanger and Joule Thompson valve.

*Berikan fungsi setiap peralatan berikut dalam ‘Dew Point Control Unit’ (DPCU); ‘knock out drum’, ‘gas heat exchanger’ dan ‘Joule Thompson valve’.*

[6 marks]

[6 markah]

- ii. Draw with complete labelling the block flow diagram of propane process in Product Recovery Unit (PRU).

*Lukiskan dengan label yang lengkap rajah aliran blok bagi proses propana dalam ‘Product Recovery Unit’ (PRU).*

[8 marks]

[8 markah]

**QUESTION 4****SOALAN 4**

CLO1

- (a) Give **THREE (3)** main equipment in Unit 3, Steam Reforming and Heat Recovery.

*Berikan **TIGA (3)** peralatan utama dalam Unit 3, 'Steam Reforming and Heat Recovery'.*

[3 marks]

[3 markah]

CLO1

- (b) In CO Conversion Unit, carbon monoxide is converted to carbon dioxide.

*Dalam Unit 'CO Conversion', karbon monoksida ditukarkan ke karbon dioksida.*

- i. Express the chemical reaction of CO conversion.

*Tunjukkan tindakbalas kimia bagi proses penukaran CO.*

[4 marks]

[4 markah]

- ii. Explain the processes that happen in this equipment, high temperature converter and low temperature converter.

*Terangkan proses yang berlaku dalam alat ini, penukar suhu tinggi dan penukar suhu rendah.*

[4 marks]

[4 markah]

CLO2

- (c) Ammonia is one of the most highly produced chemicals. There were several plants producing ammonia in Malaysia.

*Amonia merupakan salah satu bahan kimia yang paling banyak dihasilkan.*

*Terdapat beberapa loji yang menghasilkan amonia di Malaysia.*

- i. There are several process units in ammonia production. Describe the process of carbon dioxide removal in Unit 5 of the ammonia production.

*Terdapat beberapa proses unit dalam penghasilan amonia. Terangkan proses penyingkiran gas karbon dioksida dalam Unit 5 bagi penghasilan ammonia.*

[6 marks]

[6 markah]

- ii. Draw with complete label the flow diagram of ammonia plant covering Unit 1 to Unit 4.

*Lukiskan dengan label yang lengkap rajah aliran blok bagi loji ammonia merangkumi Unit 1 hingga Unit 4.*

[8 marks]

[8 markah]

### SOALAN TAMAT