

**PART A / BAHAGIAN A**

- (1). (a) Clay is typically possessed and demonstrates specific properties or characteristics that upon highly demand in wide industrial applications. Briefly discusses the typical characteristic or properties of major clay types, properties and their industrial application/usage?

*Lempung lazimnya mempunyai dan mempamirkan sifat-sifat dan ciri-ciri yang sering mendapat permintaan aplikasi yang tinggi. Secara ringkas bincang ciri ciri dan sifat utama lempung dan penggunaan utamanya*

(10 marks/markah)

- (b) What is workability chart and application?

*Apakah carta kebolegunaan dan kegunaannya?*

(10 marks/markah)

**PART B / BAHAGIAN B**

- (2). (a). Industrial minerals including silica sand are valued for their physical and/or chemical properties. Define the meaning of the Industrial Sand (silica sand) and its three main characteristics.

*Mineral industri termasuk pasir silika dinilai kerana sifat fizikal dan kimianya. Jelaskan apakah maksud Pasir Industri (pasir silika) dan tiga ciri utamanya*

(5 marks/markah)

- (b). The glass industry has established different standard specifications for the silica sand based on iron content intended for seven types of glass. State the SEVEN glass types and the maximum overall iron content.

*Industri kaca telah menetapkan spesifikasi piawai yang berlainan untuk pasir silika yang dimaksudkan berdasarkan kandungan besi untuk tujuh jenis kaca. Nyatakan TUJUH jenis kaca dan nilai tertinggi keseluruhan kandungan besi.*

(7 marks/markah)

- (c) Two different minerals with almost similar physical properties are talc and pyrophyllite. But these two minerals also have a minor difference. Compare one difference and two similarities in between talc and pyrophyllite.

*Dua mineral dengan sifat fizikal yang hampir sama adalah Talc dan pirofilit. Bandingkan satu perbezaan dan dua persamaan di antara Talc dan Pirofilit.*

(6 marks/markah)

- (d) Talc is an important industrial mineral. Explain the main use of the Talc in the industry.

*Talc adalah mineral industri yang penting. Terangkan kegunaan utama Talc di dalam industri.*

(2 marks/markah)

- (3). (a). Some industrial minerals are widely used as fillers, extenders and pigments in many end-user industries. State and discuss such end-user industries, function or product roles with relevant mineral types.

*Sebahagian mineral perindustrian diguna secara meluas sebagai pengisi, penambah dan pigmen dalam banyak industri akhir. Nyatakan dan bincangkan industri-industri akhir, fungsi atau peranan mineral itu beserta contoh-contoh mineral yang berkaitan.*

(7 marks/markah)

- (b). State the main industrial applications for feldspar. Discuss the main characteristics of feldspar and why is it so important to their applications.

*Nyatakan kegunaan industri utama feldspar. Bincangkan ciri-ciri utama feldspar yang membuatnya begitu penting dalam aplikasi-aplikasi tersebut.*

(7 marks/markah)

- (c). The barite group consists of four mineral types. Classify the four mineral types and state the chemical formulas. Describe the physical characteristics of each of them respectively.

*Kumpulan barit terdiri daripada empat jenis mineral. Klasifikasikan empat jenis mineral yang dinyatakan dan nyatakan formula kimia. Huraikan ciri-ciri fizikal setiap daripadanya.*

(6 marks/markah)

- (4). Feldspar minerals are essential components in igneous, metamorphic and sedimentary rocks, to such an extent that the classification of a number of rocks is based upon feldspar content. Briefly write the state and discuss the following

- (i). Discuss the major types and characteristic of feldspar
- (ii). Mineralogical and chemical composition
- (iii). Industrial application and its function

*Mineral feldspar adalah komponen utama batuan igneus, jelmaan dan sedimen, dan pada tahap tertentu pengelasan beberapa jenis batuan ini diklasifikasi berasaskan kandungan felsparnya*

- (i). *Bincang jenis-jenis dan ciri-ciri utama feldspar*
- (ii). *Mineralogi dan komposisi kimianya*
- (iii). *Kegunaan industri dan fungsinya.*

(20 marks/markah)

**PART C / BAHAGIAN C**

(5). Briefly describe the following:

- (i). Types of coal and calorific values
- (ii). Barite – Mineralogically, chemically and industrial application

*Secara ringkas perihalkan yang berikut:*

- (i). Jenis arang batu dan nilai kalorinya*
- (ii). Barit – iaitu mineralogi, kimia dan kegunaan industri*

*(20 marks/markah)*

(6). (a). Fly ash is a main by-product resulting from powdered coal combustion in electric generating power plant. Discuss the composition, characteristics and classes of this material, including some application?

*Abu terbang adalah produk hasil daripada proses pembakaran butiran-butiran arang batu sewaktu proses penjanaan kuasa elektrik. Bincangkan ciri-ciri, komposisi serta pengelasan, termasuk kegunaannya?*

*(8 marks/markah)*

- (b). As vegetation-rich layers are buried under sediments, pressure and increasing temperature change the nature of the material. The material forms the coal deposit with different types according to diagenesis and metamorphism degree. Explain four types of coal.

*Apabila lapisan kaya bahan tumbuhan tertimbus di bawah endapan sedimen, tekanan dan kenaikan suhu mengubah kewujudan semulajadi bahan. Bahan-bahan tersebut akan membentuk jenis-jenis arang batu yang berbeza bergantung kepada proses diagenesis dan metamorfik.*

(6 marks/markah)

- (c) The economic of the coal resources or reserve must be determine before initiating any project. Estimates of the different classes of coal resources and reserves are arbitrarily based upon three criteria. Elaborate in more detail those criterias.

*Ekonomi berasaskan sumber atau rizab arang batu hendaklah ditentukan sebelum mana-mana projek bermula. Jangkaan sumber arang batu yang berbeza kelas adalah penting berdasarkan tiga kriteria. Olahkan dengan lebih teliti kriteria tersebut.*

(6 marks/markah)

- (7). (a). What is barite in the aspects of geological occurrence, mineralogy and its application role and future in petroleum industry? State also three other major uses of barite in other industry.

*Apakah barit daripada sudut pandangan aspek kejadian geologi, mineralogi dan peranan aplikasi serta masa hadapan dalam bidang industri petroleum? Nyatakan tiga kegunaan lain barit dalam lain-lain industri.*

(8 marks/markah)

- (b). Name two feldspar groups and the minerals under each group. Draw a simple flowchart to separate feldspars from heavy minerals such as ilmenite and cassiterite.

*Namakan dua (2) kumpulan mineral feldspar dan kumpulan yang berada di bawah setiap kumpulan itu. Lakarkan carta alir ringkas bagi pemisahan feldspar daripada mineral seperti ilmenit dan kasiterit.*

(8 marks/markah)

- (c). State and discuss the important of minerals in the metallurgical and refractory related industries.

*Nyata dan bincangkan kepentingan dan kegunaan mineral industri dalam industri berkaitan metalurgi dan refraktori.*

(4 marks/markah)

**-oooOooo-**