PART A / *BAHAGIAN A*

(1). (a). (i). Describe how to select underground mine and opencast mines.

(ii). List the pre-mining operations to be carried out for an open cast mine. Also, write the applicability of open cast mining?

(iii) What is placer mining and in which location it can be found.

(i). Huraikan cara memilih lombong bawah tanah dan lombong terbuka.

(ii) Senaraikan operasi pra-perlombongan yang akan dijalankan untuk lombong terbuka. Juga, tulis kebolehgunaan perlombongan terbuka.

(iii). Apakah perlombongan placer dan di lokasi manakah ia boleh didapati.

(8 marks/*markah*)

(b). (i) Explain what is stripping ratio, break even stripping ratio and what is its significance?

(ii). A seam of coal has a density of 1.36 t/m^3 and is 2.5 m thick. It is covered by 27 m of shale which has a density of 1.7 t/m^3. Calculate the stripping ratio.

(i). Apakah nisbah pelucutan, nisbah pelucutan 'break even' dan apakah kepentingannya?

(ii). Jalur arang batu mempunyai ketumpatan 1.36 t/m^3 dan setebal 2.5 m. Ia dilitupi oleh 27 m syal yang mempunyai ketumpatan 1.7 t/m^3. Kira nisbah pelucutan.

(4 marks/*markah*)

(c). (i). Distinguish between pit slope angle and ultimate pit slope angle?

Bezakan antara sudut cerun pit dan sudut cerun pit muktamad?

(ii). Illustrate (with suitable figure) important parameters in designing a safe pit (pit slope).

Huraikan (dengan gambarajah yang sesuai) parameter penting dalam merancang lubang selamat (cerun pit).

(iii). The opencast mines have four benches. The height, width and face angle for each bench are 13 m, 30 m and 70 respectively. Calculate the overall slope angle of the benches in degrees?

Lombong terbuka mempunyai empat undak. Tinggi, lebar dan sudut muka bagi setiap undak ialah masing-masing 13 m, 30 m dan 70 m. Kira sudut cerun keseluruhan undak dalam darjah?

(8 marks/*markah*)

(2). (a). Describe in brief three categories of an underground mining methods based on its supporting mechanism. List two or more examples for each category.

Perihalkan dengan ringkas tiga kategori kaedah perlombongan bawah tanah berdasarkan mekanisme sokongan. Senaraikan dua atau lebih contoh bagi setiap kategori.

(6 marks/*markah*)

(b). Discuss the characterization of the sedimentary ore that best suite to the underground mining method as follows. List one advantage and disadvantage for each method.

Bincangkan ciri-ciri mendapan bijih yang bersesuaian dengan kaedah perlombongan di bawah. Senaraikan kebaikan dan keburukan setiap kaedah.

(i). Sub-level caving
Perampakan sub-paras

(7 marks *markah*)

(ii). Cut and Fill
Potong-dan-isi.

(7 marks/*markah*)

(3). (a). In the event of mineral deposit were exposed by quarrying operations, discuss the procedure should be taken provided that the mineral deposit is likely to be mined by the quarry (licensee/ permittee).

Di dalam keadaan deposit mineral ditemui hasil daripada aktiviti pengkuarian, bincangkan prosedur yag perlu diambil sekiranya deposit mineral tersebut ingin dilombong oleh pihak kuari (pemegang lesen/permit)

(4 marks/*markah*)

(b). List the related licenses required in exploration and mining (under the State Mineral Enactment).

Senaraikan jenis-jenis lesen yang diperlukan untuk tujuan ekplorasi dan perlombongan (di bawah Enakmen Mineral Negeri).

(7 marks/*markah*)

(c). Explain the importance of Environmental Impact Assessment (EIA) report as stipulated in section 34A of the Environmental Quality Act in which to be submitted to the Director General, Department of Environment. Describe the essential steps in completing the EIA report.

Terangkan kepentingan laporan Penilaian Kesan Alam Sekitar (EIA) seperti termaktub di dalam seksyen 34A Akta Kualiti Alam sekitar yang mana laporan tersebut perlu dihantar kepada Ketua Pengarah, Jabatan Alam Sekitar. Perihalkan langkah-langkah perlu untuk menyediakan laporan EIA tersebut.

(9 marks/*markah*)

PART B / *BAHAGIAN B*

(4). (a). Discuss in detail the main factors govern in many critical aspects of both development and exploitation in mine.

Bincangkan secara terperinci faktor utama yang mengawal aspek kritikal untuk pembangunan dan eksploitasi di lombong.

(4 marks/*markah*)

(b) Explain how pit optimization was done during mining operations

Terangkan bagaimana pengoptimuman pit dilakukan semasa operasi perlombongan.

*(*4 marks/*markah)*

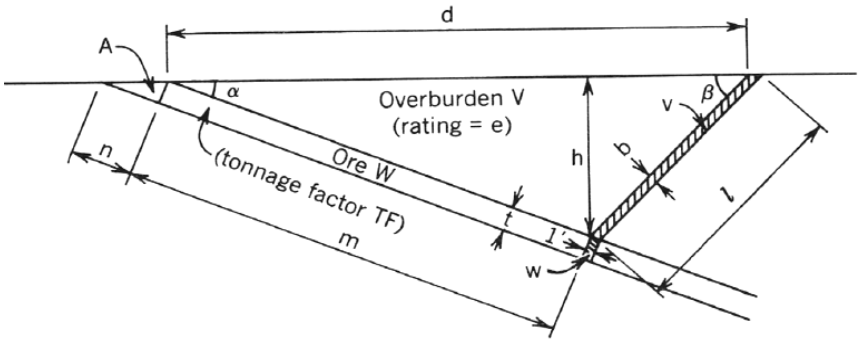

Figure 1/Rajah 1

(c). The following data are given for a mineral deposit occurring under condition similar to the diagram above:

Value of ore = RM5.29 / tonne
Costs (excluding stripping) = RM3.64 / tonne
Stripping cost (for overburden of e = 1) = RM0.26 / m^3
Berm a = 0 m
Dip of deposit, α = 20º
Pit slope, β = 60º

Deposit thickness, t = 15.2 m

Equivalent Cubic meter,e = 1

Tonnage Factor = 0.47m^3 / tonne

(i). Calculate maximum allowable stripping ratio, SR_{max}

(ii). Locate the pit limit for the deposit in terms of h

(iii). Calculate overall stripping ratio, SR_o

Data berikut diberikan untuk deposit mineral yang berlaku dalam keadaan serupa dengan rajah di atas:

Nilai bijih = RM5.29 / tan

Kos (tidak termasuk pelucutan) = RM3.64 / tan

Kos pelucutan (untuk beban berlebihan e = 1) = RM0.26 / m3

Berm a = 0 m

Dip deposit, α = 20°

Cerun pit, β = 60°

Ketebalan deposit, t = 15.2 m

Meter kubik setara, e = 1

Faktor Ketegangan = 0.47m^3 / tan

(i) Hitung nisbah pelucutan maksimum yang dibenarkan, SR_{max}

(ii). Cari had pit untuk deposit dari sebutan h

(iii) Hitung nisbah pelucutan keseluruhan, SR_o

(12 marks/*markah*)

(5). (a). Compare and explain the following surface mining method:

(i). In-Situ Mining/ Solution mining

(ii) Quarrying

(iii) Open cast (strip mining)

In your discussion please include deposit conditions, sequences, advantages and disadvantages for each method.

(a) *Bandingkan dan terangkan kaedah perlombongan permukaan berikut:*

(i) Perlombongan 'In-Situ'/'Solution'
(ii) Penkuarian
(iii) Perlombongan Terbuka

Dalam perbincangan anda sila sertakan keadaan, urutan, kelebihan dan kekurangan untuk setiap kaedah

(9 marks/*markah*)

(b). The head assay of a copper ore is 0.8% Cu. The expected overall Cu recovery from the ore is 88%. Calculate the maximum stripping ratio if the total cost of production (excluding overburden removal) is RM5.90 per ton of ore and overburden removal costs are RM0.3 per ton of waste. Assume copper values of RM1.00, RM1.25, and RM1.50 per kg of refined metal at the smelter.

Ujian asai bagi bijih kuprum adalah 0.8% Cu. Jangkaan perolehan Cu keseluruhan daripada bijih ialah 88%. Kira nisbah pelucutan maksimum jika jumlah kos pengeluaran (tidak termasuk penyingkiran beban lebih) ialah RM5.90 setiap tan bijih dan kos penyingkiran beban lebihan adalah RM0.3 setiap tan sisa. Andaikan nilai kuprum RM1.00, RM1.25 dan RM1.50 setiap kg logam diproses di kilang peleburan.

(5 marks/*markah*)

(c). (i) Explain the operating component of a drilling system.

(ii) Give the parameters to be considered for selection of drilling machines?

(i) Terangkan komponen pengendalian sistem penggerudian.

(ii). Berikan parameter yang perlu dipertimbangkan untuk pemilihan mesin gerudi?

(6 marks/*markah*)

(6). (a). **State** the reasons for operating underground mine.

Nyatakan *sebab-sebab pengoperasian lombong bawah tanah.*

(4 marks/*markah*)

(b). **Discuss** on these topics with its relation to underground mining operations:

Bincangkan *topik-topik berikut dan kaitannya dengan operasi lombong bawah tanah:*

(i). Mine life

Hayat lombong

(3 marks/*markah)*

(ii). Number of openings

Bilangan bukaan

(3 marks/*markah)*

(iii). Shape and size opening

Bentuk dan saiz bukaan

(4 marks/*markah)*

(c). With the aid of diagram, **comment** on the coal deposit characteristic and geological settings (depth, size and shape) for the coal seam for the transportation purpose (using the skip or conveyor belt) for an underground main access opening as follows. Assume that the main coal seam deposit lies within the horizontal direction.

Dengan bantuan gambarajah, ***komen*** *berkenaan kriteria endapan arang batu dan keadaan geologi (kedalaman, saiz dan bentuk endapan) yang paling sesuai bagi tujuan pengangkutan (sama ada menggunakan skip atau tali sawat) untuk bukaan lombong bawah tanah berikut. Anggap lapisan lipit arang batu adalah pada kedudukan melintang.*

(i) Drift (or adit) / *Kolong*
(ii) Slope (inclined shaft) / *Cerun (syaf condong)*
(iii) Vertical shaft / *Syaf mencancang*

(6 marks/*markah)*

(7). **Write** brief notes on the following topics in accordance to the requirements of the mining laws.
Tuliskan *nota ringkas ke atas tajuk berikut menurut keperluan undang-undang melombong.*

(i). Mineral tenement
Tenemen mineral

(4 marks/*markah*)

(ii). Mineral
Mineral

(4 marks/*markah*)

(iii). Operational Mining Scheme (OMS).
Skim Pengendalian Melombong.

(4 marks/*markah*)

(iv). Mining Lease (ML).
Pajakan Melombong.

(4 marks/*markah*)

(v). Prospecting Licence (PL)
Lesen pencarigalian

(4 marks/*markah*)

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