

SULIT

POLITEKNIK
Jabatan Pengajian Politeknik

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENGAJIAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN MEKANIKAL

PEPERIKSAAN AKHIR
SESI JUN 2013

JF302: MATERIAL TECHNOLOGY 1

TARIKH : 30 OKTOBER 2013
TEMPOH : 2 JAM (8.30 AM - 10.30 AM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak termasuk muka hadapan.

Bahagian ini mengandungi **ENAM (6)** soalan esei. Jawab **EMPAT (4)** soalan sahaja.

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

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JF302:MATERIAL TECHNOLOGY 1

INSTRUCTION:

This section consists of **SIX (6)** essay questions. Answer **FOUR (4)** questions only.

ARAHAN :

Bahagian ini mengandungi ENAM (6) soalan esei. Jawab EMPAT (4) soalan sahaja.

QUESTION 1

SOALAN 1

a) Define the following items.

- i. Atom
- ii. Element
- iii. Compound

Definisi perkara berikut :

- i. Atom
- ii. unsur
- iii. sebatian

[6 marks]

[6 markah]

CLO1
C1

(b) Refer to Diagram 1(b), analyze the phenomena of change in this process.

CLO1
C4

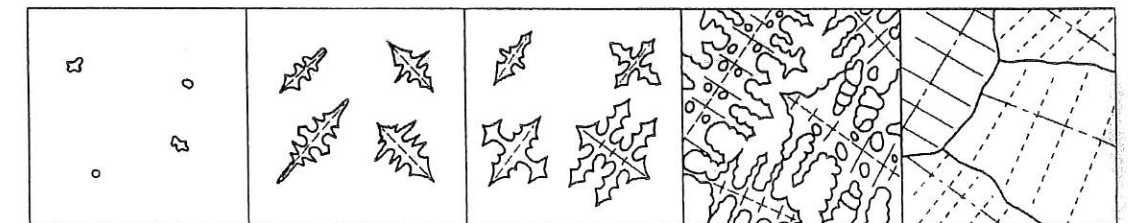


Diagram 1(b) / Rajah 1(b)

Merujuk kepada Rajah 1, analisa perubahan fenomena yang berlaku dalam proses ini.

[9 marks]

[9 markah]

- CLO1
C3 (c) The unit cell is the smallest structure that repeats itself by translation through the crystal. Write and sketch **THREE (3)** types of crystals structures.
- Unit sel adalah struktur terkecil yang berulang dan boleh di gambarkan melalui bentuk hablur. Tuliskan dan lakarkan TIGA (3) jenis struktur hablur.*
- [6 marks]
[6 markah]

- CLO1
C4 (d) Compare the differences between substitutional and interstitial solid solution.
- Bandingkan perbezaan di antara larutan pepejal gantian dan celahan.*
- [4 marks]
[4 markah]

QUESTION 2
SOALAN 2

- CLO1
C1 a) Define these *iron ore* characteristics.
- Terangkan ciri-ciri bijih besi berikut*
- Grade
Gred
 - Density
Ketumpatan
- [6 marks]
[6 markah]

- CLO1
C2 b) Identify **THREE (3)** advantages of *Electric Arc Furnace*.
- Kenalpasti TIGA (3) kelebihan Relau Arka Elektrik*
- [6 marks]
[6 markah]

- CLO1
C2 c) Heat resistant steel is one of the alloys steel. Explain the characteristic of the heat resistant steel.
- Keluli Perintang Haba adalah salah satu daripada Keluli Aloi. Terangkan cir-ciri Keluli Perintang Haba.*
- [5 marks]
[5 markah]

- CLO1
C4 d) Compare the differences between Grey Cast Iron and White Cast Iron.
- Bandingkan perbezaan diantara Besi Tuang Kelabu dan Besi Tuang Putih*
- [8 marks]
[8 markah]

QUESTION 3
SOALAN 3

- CLO2
C1 a) i. Define Heat Treatment and state **THREE (3)** types of Heat Treatment.
- Berikan maksud rawatan haba dan nyatakan TIGA (3) jenis rawatan haba*
- [5 marks]
[5 markah]

- CLO2
C2 iii. Explain the importance of Heat Treatment in engineering applications.
- Terangkan kepentingan Rawatan haba dalam bidang kejuruteraan.*
- [6 marks]
[6 markah]

- CLO2
C3 b) Normalising is one of the heat treatment processes which produce a balance structure. Write down how the process takes place.
- Penormalan adalah satu daripada proses rawatan haba untuk menghasilkan struktur yang seimbang. Tuliskan bagaimana proses ini berlaku.*
- [7 marks]
[7 markah]

- CLO2
C5 c) Explain the **Case Hardening in Nitrating** process and give **TWO (2)** examples of Nitrated components.
- Jelaskan Pengerasan Selongsong dalam Proses Penitradan dan berikan DUA (2) contoh komponen Nitrat*
- [7 marks]
[7 markah]

QUESTION 4

SOALAN 4

- a) After the heat treatment process, a product will undergo material testing for particular purposes.

Selepas proses rawatan haba, suatu produk akan menjalani pengujian bahan untuk tujuan-tujuan tertentu.

CLO3
C1

- i. List down **FOUR (4)** purposes of material testing is being performed.
Senaraikan EMPAT (4) tujuan pengujian bahan dilaksanakan.

[4 marks]

[4 markah]

CLO3
C2

- ii. Describe the elasticity and plasticity.

Huraikan keelastikan dan keplastikan.

[4 marks]

[4 markah]

- (b) In a destructive testing, several testing are carried out to determine the mechanical properties of a material.

Dalam ujian musnah, beberapa siri pengujian dilakukan untuk mengenalpasti sifat-sifat mekanikal bahan yang diuji.

CLO3
C2

- i. State the mechanical property that could be measured using Brinell, Vickers, Rockwell and Shore Solerescope testing.

Nyatakan sifat mekanikal yang boleh diukur melalui ujian Brinell, Vickers, Rockwell dan Shore Solerescope.

[1 mark]

[1 markah]

CLO3
C2

- ii. Based on your answer in question 4(b) (i), give the definition of the given property.

Berdasarkan kepada jawapan anda di soalan 4(b)(i), berikan definisi sifat mekanikal tersebut.

[2 marks]

[2 markah]

CLO3
C2

- iii. Explain briefly about the Brinell test.

Terangkan secara ringkas mengenai ujian Brinell.

[6 marks]

[6 markah]

CLO3
C4

- iv. Point out the purpose of conducting Impact test and analyze **TWO (2)** differences between Izod and Charpy Impact test.

Kenalpasti tujuan ujian Hentaman dilakukan dan analisa DUA (2) perbezaan di antara ujian Hentaman Izod dan Charpy.

[6 marks]

[6 markah]

CLO3
C5

- (c) Non-destructive testing is widely applied in industrial field such as oil and gas, construction, piping and many more. Explain the purpose of conducting this test

Ujian tanpa musnah digunakan secara meluas di bidang pengindustrian seperti minyak dan gas, pembinaan, perpaipan dan sebagainya. Terangkan tujuan ujian tanpa musnah dilakukan.

[2 markah]

[2 marks]

QUESTION 5

SOALAN 5

CLO3
C1

- a) List **THREE (3)** types of non-ferrous metals. State **ONE (1)** characteristic and **ONE (1)** application of aluminium and aluminium alloys that are widely used in industry.

Senaraikan TIGA (3) jenis logam bukan ferus. Nyatakan SATU (1) ciri dan SATU (1) aplikasi bagi aluminium dan aloi aluminium untuk kegunaan industri.

[7 marks]
[7 markah]

CLO3
C1

- b) Define wet corrosion.

Beri definisi bagi kakisan basah.

[3 marks]
[3 markah]

CLO3
C3

- c) Grain interface corrosion is one type of localized corrosion. With the aid of a diagram, explain this type of corrosion.

Kakisan antara bijian adalah salah satu jenis kakisan setempat. Terangkan jenis kakisan tersebut.

[7 marks]
[7markah]

CLO3
C4

- d) In the electrochemical series, anode metal is more corrosive to the cathode metal in electrolyte environment. Analyze the phenomena.

Merujuk siri elektrokimia, logam anod akan terkakis berbanding logam katod di dalam larutan elektrolit. Analisa fenomena ini.

[8 marks]
[8 markah]

QUESTION 6

SOALAN 6

CLO1,2
C4

- a) Compare **TWO (2)** differences of thermoplastic and thermosetting.

Bandingkan DUA (2) perbezaan antara termoplastik dan termoset.

[8 marks]
[8 markah]

CLO1,2
C4

- b) Compare **TWO (2)** differences of addition polymerization and condensation polymerization.

Bandingkan DUA (2) perbezaan antara pemolimeran tambahan dan pemolimeran kondensasi.

[8 marks]
[8 markah]

CLO1,2
C3

- c) The following Figure 6(c) shows a diagram of Injection Molding Machine. Write the definition of Injection Moulding and explain the process involved.

Rajah 6 (c) dibawah menunjukkan Mesin Pengacuan Suntikan. Tuliskan definisi proses pengacuan suntikan dan terangkan proses yang terlibat.

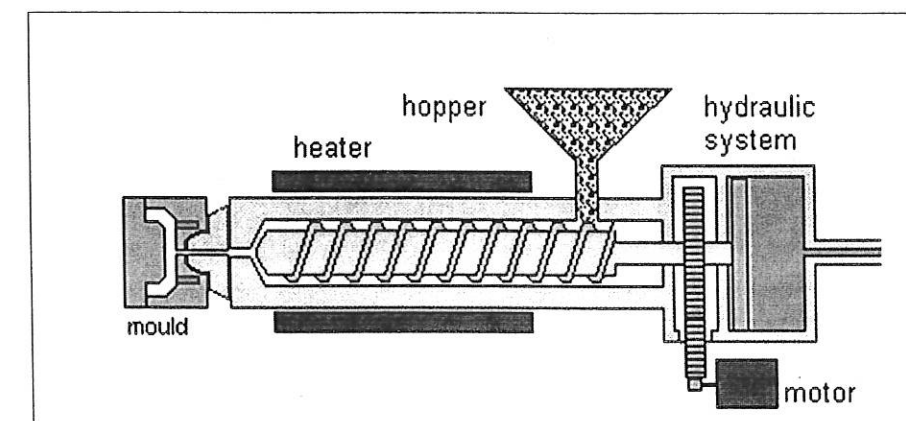


Figure 6 (c)

[9 marks]
[9 markah]

SOALAN TAMAT