

LAMPIRAN D3



PENYEMAKAN KERTAS SOALAN PEPERIKSAAN
Proof-reading of Examination Question Paper

Untuk Kegunaan Seksyen Peperiksaan dan Pengijazahan	
Nombor Sampul	
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Gunakan satu proforma untuk satu kertas soalan peperiksaan.
Use separate proforma for each Question Paper

Kepada : Ketua Penolong Pendaftar
Seksyen Peperiksaan dan Pengijazahan

SAYA/KAMI TELAH MENYEMAK SALINAN-SALINAN KERTAS SOALAN PEPERIKSAAN BERTAIP YANG DISEBUTKAN DI BAWAH INI :

I/We have checked the typed copies of the Examination Paper stated below :

Kod Kursus : EBP 203 / 3 Tajuk Kursus : Bahan plastik
Course Code Course Title Plastic Materials

Jangka Masa Peperiksaan : 3 Jam Bilangan Muka Surat Bertaip : 9 Muka Surat Bilangan Soalan Yang Perlu Dijawab : 5 Soalan
Duration of Examination Hours Number of typed pages Pages Number of questions required to be answered Questions

Soalan-soalan dijawab atas : Questions to be answered in : Sila (✓) Please (✓)	BUKU JAWAPAN Answer Book	OMR OMR Form	JAWAB DALAM KERTAS SOALAN Answer In Question Paper
	✓		

DENGAN INI DISAHKAN BAHAWA KERTAS SOALAN PEPERIKSAAN INI ADALAH TERATUR, BETUL DAN SEDIA UNTUK DICETAK.
Certified that this question paper is in order, correct and ready for printing.

Nama Pemeriksa : DR. AZHAR BIN Tandatangan : [Signature] Tarikh : 20/10/2016
Name of Examiner(s) Signature Date
Huruf Besar ABU BAKAR

KU MARBILA [Signature] 20/10/2016

Tandatangan dan Cop Rasmi: [Signature] Tarikh : 11/11/16
DEKAN/PENGARAH Dekan Date
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NOTA : Pemeriksa-pemeriksa yang menyediakan kertas soalan peperiksaan adalah bertanggungjawab atas ketepatan isi kandungan kertas soalan peperiksaan berkenaan.
NOTE : Accuracy of the contents of the question paper is the responsibility of the Examiner(s) who set the question paper.

UNIVERSITI SAINS MALAYSIA

First Semester Examination
2016/2017 Academic Session

December 2016 / January 2017

EBP 203/3 – Plastic Materials *[Bahan Plastik]*

Duration : 3 hours
[Masa : 3 jam]

Please ensure that this examination paper contains NINE printed pages before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi SEMBILAN muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

This paper consists of SEVEN questions. ONE question in PART A, THREE questions in PART B and THREE questions in PART C.

[Kertas soalan ini mengandungi TUJUH soalan. SATU soalan di BAHAGIAN A, TIGA soalan di BAHAGIAN B dan TIGA soalan di BAHAGIAN C.]

Instruction: Answer FIVE questions. Answer ALL questions from PART A, TWO questions from PART B and TWO questions from PART C. If a candidate answers more than five questions only the first five questions answered in the answer script would be examined.

[Arahan: Jawab LIMA soalan. Jawab SEMUA soalan dari BAHAGIAN A, DUA soalan dari BAHAGIAN B dan DUA soalan dari BAHAGIAN C. Jika calon menjawab lebih daripada lima soalan hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]

The answers to all questions must start on a new page.

[Mulakan jawapan anda untuk semua soalan pada muka surat yang baru.]

You may answer a question either in Bahasa Malaysia or in English.

[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]

In the event of any discrepancies in the examination questions, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunakan.]

PART A / BAHAGIAN A

1. [a] (i) Figure 1 show the schematic diagram of interaction between matrix and filler. Explain the figure shown.

Rajah 1 menunjukkan rajah skematik interaksi antara matrik dan pengisi. Jelaskan rajah yang ditunjukkan.

- (ii) Suggest two (2) tests that can be used to evaluate the interaction/adhesion between matrix and filler?

Cadangkan dua (2) ujian yang boleh digunakan untuk menguji interaksi/ikatan antara matrik dan pengisi?

- (iii) What will happen to the compound if $I_{AA} \gg I_{PA}$?

Apa akan berlaku pada sebatian jika $I_{AA} \gg I_{PA}$?

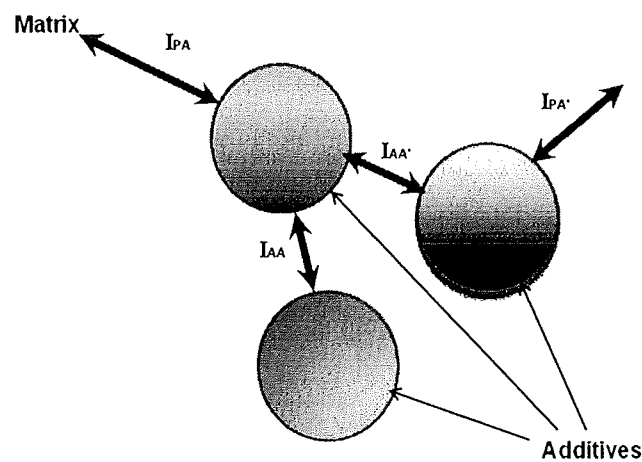


Figure 1 - Schematic diagram of interaction between matrix and filler.

Rajah 1 - Rajah skematik interaksi antara matrik dan pengisi.

(50 marks/markah)

- [b] Explain the term thermoset and thermoplastic.

Jelaskan istilah termoset dan termoplastik.

(20 marks/markah)

...3/-

- [c] Thermoset polymers are very useful in the manufacturing of electrical insulator. Name a thermoset used for this purpose and describe the properties that make it suitable for electrical insulator.

Polimer termoset amat berguna di dalam pengeluaran penebat elektrik. Namakan satu termoset yang digunakan untuk tujuan ini dan terangkan ciri-ciri yang membuatkan ia sesuai untuk penebat elektrik.

(30 marks/markah)

PART B / BAHAGIAN B

2. [a] It is known that interaction between plastic matrix and filler can be increased by increasing filler surface area. Suggest three (3) methods that can be used to increase filler surface area of particulate filler.

Diketahui bahawa interaksi antara matrik plastik dan pengisi dapat ditingkatkan dengan meningkatkan luas permukaan pengisi. Cadangkan tiga (3) kaedah yang boleh digunakan untuk meningkatkan luas permukaan pengisi partikulat.

(30 marks/markah)

- [b] (i) In plastic compounding, breaking up of filler agglomeration and dispersion the filler homogeneously in the compound is required. What would happen to the mechanical properties of the product if
- (a) Distributive mixing was achieved but dispersive mixing was not achieved during compounding?
 - (b) Distributive mixing was not achieved but dispersive mixing was achieved during compounding?

Dalam penyebatian plastik, pemecahan penggumpalan pengisi dan penyebaran pengisi tersebut dengan sekata di dalam sebatian adalah diperlukan. Apa akan terjadi pada sifat-sifat mekanikal produk jika

- (a) pencampuran distributif tercapai tetapi dispersif tidak tercapai semasa penyebatian?*
- (b) pencampuran distributif tidak tercapai tetapi dispersif tercapai semasa penyebatian?*

(30 marks/markah)

- (ii) Give two (2) examples of defect that could occur in the plastic compound product.

Berikan dua (2) contoh kecacatan yang mungkin berlaku pada sebatian plastik produk.

(10 marks/markah)

...5/-

- [c] (i) What is masterbatch? Give your opinion on the importance of masterbatch in plastic compounding by giving three (3) suitable examples.

Apakah baya induk? Beri pendapat anda terhadap kepentingan baya induk dalam penyebatian plastik dengan memberikan tiga (3) contoh yang sesuai.

(30 marks/markah)

3. [a] Discuss FOUR (4) plasticizers theory.

Bincangkan EMPAT (4) teori pemplastik.

(40 marks/markah)

- [b] Describe dough moulding compound (DMC) and its application.

Jelaskan "dough moulding compound (DMC)" dan penggunaannya.

(20 marks/markah)

- [c] Additives make plastics safer and additives also make plastics work longer. Elaborate on the statement by giving two (2) suitable examples of the use of additives.

Bahan tambah membuatkan plastik lebih selamat dan bahan tambah juga membuatkan plastik tahan lebih lama. Beri penjelasan terhadap pernyataan tersebut dengan memberikan dua (2) contoh penggunaan bahan tambah yang sesuai.

(40 marks/markah)

4. [a] Compounding between polypropylene (PP) and short glass fibre (30 wt%) was done by using single screw extruder. Dumbbell samples were prepared by using injection moulding. Tensile test was done on the samples and the result is shown in Table 1.
- (i) Compare and give your comment on tensile strength and standard deviation for both samples.

Penyebatian polipropilena (PP) dan gentian kaca pendek (30 wt%) telah dilakukan dengan menggunakan ekstuder skru tunggal. Sampel dumbel disediakan dengan menggunakan pengacuanan suntikan. Ujian tensil telah dilakukan terhadap sampel tersebut dan keputusan ditunjukkan dalam Jadual 1.

- (i) *Banding dan berikan komen anda terhadap kekuatan tensil dan sisihan piawai untuk kedua-dua sampel.*

Table 1: Tensile strength of unfilled polypropylene (PP) and polypropylene composite

Jadual 1: Kekuatan tensil polipropilena tanpa pengisi dan komposit polipropilena

Sample <i>Sampel</i>	Tensile strength (MPa) <i>Kekuatan Tensil (MPa)</i>
Unfilled polypropylene <i>Polipropilena tanpa pengisi</i>	35.0 ± 1.0
Short glass fibre reinforced polypropylene <i>Polipropilena diperkukuhkan gentian kaca pendek</i>	60.0 ± 8.0

(20 marks/markah)

- [b] In your opinion, does distributive and dispersive mixing was achieved in composite sample produced in Table 1. Explain your answer.

Pada pendapat anda, adakah pencampuran distributif dan dispersif telah tercapai dalam sampel komposit yang dihasilkan dalam Jadual 1. Jelaskan jawapan anda.

(20 marks/markah)

...7/-

- [c] Is the same result as in Table 1 will be obtained if short glass fibre was replaced by short carbon fibre? Explain your answer.

Adakah keputusan yang sama seperti dalam Jadual 1 akan didapati jika gentian kaca pendek digantikan dengan gentian karbon pendek? Jelaskan jawapan anda.

(20 marks/markah)

- [d] Predict the tensile strength if the filler loading was increased to 50 wt%.

Ramalkan kekuatan tensil jika kandungan pengisi tersebut ditambah kepada 50 wt%.

(10 marks/markah)

- [e] Give two (2) suggestions to improve the tensile strength of short glass fibre filled polypropylene.

Berikan dua (2) cadangan untuk meningkatkan kekuatan tensil polipropilena terisi gentian kaca pendek.

(20 marks/markah)

- [f] Suggest tensile strength of the composite if twin screw extruder is used to compound the composite with justification.

Cadangkan kekuatan tensil komposit jika ia dihasilkan dengan menggunakan ekstruder skru berkembar dengan memberikan justifikasi.

(10 marks/markah)

PART C / BAHAGIAN C

5. [a] Describe three different types of polyethylene (PE). Support your explanation with structure diagram, properties and applications.

Terangkan tiga jenis polietilena (PE) yang berbeza. Sokong penerangan anda dengan gambarajah struktur, ciri-ciri dan aplikasi.

(60 marks/markah)

- [b] Explain how does changing the molecular weight distribution (MWD) affect the processability of the plastics?

Terangkan bagaimana perubahan pada taburan berat molekul boleh mengubah pemprosesan plastik?

(40 marks/markah)

6. [a] Two major types of acetal resins are commonly available, a homopolymer and a copolymer. Compare these two types of acetal resins.

Kebiasaannya, terdapat dua jenis utama resin asetal, homopolimer dan kopolimer. Bandingkan dua jenis resin asetal tersebut.

(60 marks/markah)

- [b] To reduce the cycle time during injection moulding of acetal production, a lower temperature has been set by using chilled water. However, it was found that the strength of the acetal part has decreased significantly. Define the cause of the problem.

Untuk mengurangkan masa kitaran semasa pengacuanan suntikan asetal, suhu yang rendah telah dilaraskan dengan menggunakan air yang disejukkan. Walau bagaimanapun, telah didapati kekuatan asetal telah berkurangan. Jelaskan kenapa masalah ini berlaku.

(40 marks/markah)

7. [a] Give definition of resin and describe the forms of plastic resins.

Berikan takrifan bagi resin dan terangkan bentuk plastik resin.

(20 marks/markah)

- [b] A way of processing Polyvinyl Chloride (PVC) without high heat is to add plasticizers. Name most commonly plasticizers used in PVC and describe the function of plasticizers.

Satu cara pemprosesan Polivinil Klorida (PVC) tanpa pemanasan yang tinggi ialah dengan menambah pemplastik. Namakan pemplastik yang paling biasa digunakan dalam PVC and terangkan fungsi pemplastik.

(20 marks/markah)

- [c] The repeating units of nylon contain chains of carbon atoms. There are various types of nylon depending on the nature of those chains. Name three different types of nylon and describe three applications of nylon in industry.

Unit pengulangan nilon mengandungi rantai-rantai karbon. Terdapat pelbagai jenis nilon bergantung pada ciri rantai tersebut. Namakan tiga jenis nilon dan terangkan tiga aplikasi nilon di dalam industri.

(60 marks/markah)