UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session of 2004/2005

October 2004

EBB 523 - Ceramic Processing

Time : 3 hours

Please ensure that this paper consists of FOUR printed pages before you proceed with the examination.

This paper contains SEVEN questions.

Answer any FIVE questions. If a candidate answer more than five questions, only the first five answered will be examined and awarded marks.

Answer to any question must start on a new page.

Questions can be answered in Bahasa Malaysia or English.

1. There are some differences in the ceramic processing philosophy for advanced ceramics and conventional ceramic bodies. Discuss about the above statement and provide suitable examples to enhanced you discussion. You have to mention the specific product for the discussion.

Falsafah pemprosesan seramik bagi hasilan jasad seramik maju dan jasad seramik konvensional adalah agak berbeza. Bincangkan kenyataan tersebut dan berikan contoh-contoh yang bersesuaian untuk mengukuhkan perbincangan anda, termasuklah menyatakan hasilan yang dipilih untuk perbincangan.

(100 marks)

2. [a] What are the effects of fibre orientations in the matrix of a ceramic composite. Provide detail discussion.

Apakah kesan orientasi gentian di dalam matriks sesuatu sistem komposit seramik. Bincangkan dengan terperinci.

(30 marks)

[b] Explain about the pressure casting and gelcasting techniques? Differentiate and compare of both techniques.

Terangkan tuangan tekanan (pressure casting) dan tuangan gel (gel casting). Beza dan bandingkan juga kedua-dua proses tersebut.

(70 marks)

3. [a] What do you understood about soft and hard binders used in powder pressing process? Explain about their effects onto the compacted ceramic bodies.

Apakah yang anda faham tentang pengikat lembut (soft binder) dan pengikat keras (hard binder) dalam kaedah pembentukan penekanan serbuk. Terangkan kesannya terhadap pemadatan jasad seramik tersebut.

(40 marks)

[b] Differentiate and compare about the compacted body using ungranulated powders and granulated powders. Discuss about their effects onto the fired products.

Beza dan bandingkan kesan pemampatan jasad dengan penggunaan serbuk tak granul (ungranulated powders) dan serbuk granul (granulated powders). Bincangkan juga kesannya terhadap hasilan selepas bakar.

(60 marks)

4. What are the various conditions that determined injection moulding technique can be considered as suitable and economical for the production of ceramic articles? Discuss in detail about the various raw materials preparation requirements before injection process can be carried out successfully.

Bilakah kaedah acuan suntikan dikatakan sesuai dan ekonomik untuk menghasilkan produk seramik? Bincangkan dengan terperinci syarat-syarat bahan mentah seramik yang perlu disediakan sebelum dilakukan proses acuan suntikan yang sempurna.

(100 marks)

5. You were asked to prepare a comprehensive report about selection of the production process of Si_3N_4 turbine blade. Discuss in detail about the content of the report.

Anda diarahkan untuk menyiapkan satu laporan lengkap mengenai pilihan proses penghasilan kipas turbin yang diperbuat daripada Si_3N_4. Bincangkan dengan teliti mengenai isi kandungan laporan ini.

(100 marks)

6. Discus in detail about the main role of various organic and inorganic additives needed in most of the ceramic products production processes. Provide examples for a better explanation.

Bincangkan mengenai peranan penting bahan-bahan tambah organik dan tak organik yang diperlukan dalam kebanyakkan proses penghasilan produk seramik. Gunakan beberapa contoh yang sesuai untuk menjelaskan jawapan anda.

(100 marks)

7. Discuss in detail about the following ceramic processing techniques :

(a) Ceramic as the reinforcement component(s) in MMCs.

(b) Ceramic materials prepared via precursors.

(c) Gelcasting vs slip casting.

Huraikan dengan sempurna mengenai kaedah-kaedah pemprosesan seramik yang berikut :

(a) Penambahan bahan seramik sebagai penguat komposit MMC.

(b) Penyediaan seramik daripada bahan-bahan prapenanda.

(c) Tuangan gel berbanding tuangan slip.

(100 marks)

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