
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session of 2003/2004

September/October 2003

EBB 523/3 - Ceramic Processing

Time : 3 hours

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

This paper contains SIX questions.

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

Answer to any question must start on a new page.

All questions can be answered in Bahasa Malaysia or English.

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1. [a] Explain the concept of uniformity in the processing of ceramics. Discuss the importance of the uniformity concept in relation to the quality of product. (40 marks)
- [b] Compare and contrast the development of microstructure in a refractory material (example-magnesium) and an advanced ceramic material (example-alumina). What is the philosophy behind the processing of both the discussed materials? (60 marks)
2. [a] Discuss two (2) common problems probably encountered in a uniaxial powder pressing. What are the possible solutions to both the problems you have discussed? (40 marks)
- [b] Briefly discuss the use of binders in ceramic processing and how the choice of binder affects the properties of a ceramic item. (30 marks)
- [c] What do you understand about radial pressure coefficient. What are the factors influencing the coefficient? (30 marks)
3. Describe 3 (three) common commercially available casting techniques. What are the important parameters to be considered in each techniques. Explain the advantages and disadvantages for each technique. Discuss also the recent development in each technique. (100 marks)

4. Explain in detail why tape casting of ceramic materials is considered as "a very specialized ceramic fabrication technique"? Support your explanation with sketches.

(100 marks)

5. Why does the injection moulding technique not widely used for fabrication of ceramic products? What are the various requirements that could be as major obstacles to the application of this technique? Provide your detail explanation.

(100 marks)

6. Write with enough details only 3 from the following ceramic processing techniques.

- (i) Sol-gel
- (ii) Vapour deposition
- (iii) Polymer - derived ceramics
- (iv) Self-propagating and high temperature synthesis
- (v) Direct metal oxidation
- (vi) Reaction – forming processes

(100 marks)