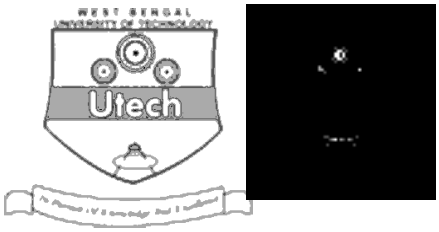
PROCESS CERAMICS – II (SEMESTER - 6)

CS/B.TECH (CT)/SEM-6/CT-605/09



1. .....
Signature of Invigilator

2. .....
Signature of the Officer-in-Charge

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/B.TECH (CT)/SEM-6/CT-605/09
PROCESS CERAMICS – II (SEMESTER - 6)

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question.**
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

.....
Head-Examiner/Co-Ordinator/Scrutineer

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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

PROCESS CERAMICS – II

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Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Hexagonal close packing of uniform spheres gives densification (% theoretical)

a) 80% b) 74%

c) 50% d) none of these.

ii) In stoichiometric spinel, molar ratio of MgO : Al_2O_3 is

a) 2 : 1 b) 1 : 2

c) 1 : 1 d) none of these.

iii) Nature of closed pores present in ceramic bodies is

a) intergranular

b) intragranular

c) both intergranular and intragranular

d) none of these.

iv) In Furnas model of packing of two component ceramic powders to get maximum packing density, the ratio of wt. % coarse : wt. % fines is

a) 55 : 45 b) 30 : 70

c) 70 : 30 d) none of these.

v) Bulk density of a ceramic body is equal to its true specific gravity when

a) % open pores = 0

b) % closed pores = 0

c) % open pores + % closed pores = 0

d) none of these.

vi) For a ceramic body of fixed bulk density its % A.P. should have

a) fixed value

b) value changes with change of A.P. Sp. gr.

c) values changes without any change of A.P. Sp. gr.

d) none of these.

vii) Alumina body can reach its theoretical density when sintering atmosphere is

a) Air b) N_2

c) H_2 d) none of these.

viii) Bench mark model of solid-state sintering was introduced by

a) Kingery b) D. L. Johnson

c) Kuezynski d) none of them.

ix) Isostatically pressed ceramic bodies have better packing density since in it forming pressure is applied from

a) one direction b) two directions

c) all directions d) none of these.

x) During initial state sintering the ceramic compact body undergoes

a) massive densification b) minor densification

c) no densification d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions. 3 × 5 = 15

2. Discuss briefly the agglomeration behaviours of fine ceramic powders.

3. Define agglomerates and agglomeration. Discuss briefly on what basis agglomerates are classified.

4. Describe with diagram, the Furnas powder compaction model of binary powders.

5. Discuss briefly the morphological changes taking place during solid state sintering.

6. Define mono-size mono-disperse ceramic powders. Why are submicron mono-size mono-disperse ceramic powders difficult to make ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. Define spinel. How are they classified ? Describe briefly the structure of spinel. Discuss briefly how refractory grade alumina enriched spinel (Al_2O_3 — 78 wt. % min and MgO — 20% wt. % min) can be made in the plant. State some of its important uses.

2 + 2 + 2 + 6 + 3

8. Define cold isostatic pressing. How are they classified ? How does it differ from ordinary hydraulic pressing. Discuss briefly how spark plug insulators can be made by cold isostatic pressing. 2 + 2 + 4 + 7

9. Define solid-state sintering. How does it differ from liquid-state sintering ? Discuss briefly Kuezynski's solid-state sintering model. Why is the model so important to study solid state sintering ? 4 + 2 + 6 + 3

10. What is driving force of sintering ? Calculate the driving force of sintering when ceramic powders of uniform spherical size of diameter 2 microns are undergoing solid-state sintering. Name different mass transport mechanisms operating during solid-state sintering. Briefly discuss any *two* of them. 3 + 4 + 3 + 5

11. Write short notes on any *three* of the following : 3 × 5

a) Sintering aids

b) Material characterization techniques of ceramic materials

c) Co-precipitation technique

d) Tape casting technique

e) Sol-gel technique.

END