



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech(CT)/SEM-1/M(CT)-104/2009-10  
2009**

**ADVANCED CERAMIC PROCESSING**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A  
( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :

$$10 \times 1 = 10$$

- i) Most suitable particle size range of monosize ceramic powder is
- a) 5 – 15  $\mu\text{m}$                       b) 5 – 7  $\mu\text{m}$
- c) 5 – 100  $\mu\text{m}$                       d) none of these.
- ii) During coprecipitation, the precipitate contains
- a) one cation and one anion
- b) one cation and more than two anions
- c) more than one cations and one anion
- d) none of these.



- iii) In soft agglomerates, bond between individual particles is made by
- ceramic bonding
  - van der Waals bonding
  - Combination of type both of these (a) and (b)
  - none of these.
- iv) Maximum packing density achieved with unisize spherical powder is
- 74% theoretical
  - 62% theoretical
  - 50% theoretical
  - none of these.
- v) % A.P. of a ceramic body is zero when
- B.D. < A.S.G.
  - B.D. = A.S.G.
  - B.D. > A.S.G.
  - none of these.
- vi) In Furnas powder compaction model, maximum packing density is achieved when wt% coarse : wt% fine is
- 60 : 40
  - 70 : 30
  - 30 : 70
  - none of these.
- vii) In isostatic pressing, forming pressure is applied on a body from
- one direction
  - two directions
  - all directions
  - none of these.
- viii) Bench marked model of solid-state sintering was introduced by
- W.D. Kingery
  - Kuczynski
  - D.L. Johnson
  - None of them.



- ix) Densification during sintering is caused by
- a) surface diffusion
  - b) evaporation and condensation
  - c) volume diffusion
  - d) none of these.
- x) Sintering model of intermediate stage sintering was introduced by
- a) R.L. Coble and T.K. Gupta
  - b) Kingery and T.K. Gupta
  - c) Norton and Kingery
  - d) None of them.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Discuss briefly how ceramic powders are characterized.
3. Discuss briefly how microstructure of green body is related to the microstructure of sintered body.
4. Write short note Granulation by spray dryer of ceramic precursors.
5. What are chemical vapour deposition and physical vapour deposition ?
6. What is the role of sintering aids on solid state sintering of ceramic bodies ?



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. Define co-precipitation. Describe with process-flow diagram how magnesium aluminate hydrate is prepared by co-precipitation technique. State the role of pH during co-precipitation on  $\text{MgO} : \text{Al}_2\text{O}_3$  stoichiometry of magnesium aluminate spinel.  $2 + 9 + 4$
8. Define Sol-Gel technique. How does it differ from precipitation technique ? Discuss briefly how mono-size and mono-dispersed submicron ceramic powders are prepared in the laboratory. Why do ceramic powders prepared by Sol-Gel technique give better sintered microstructure than the same prepared by other techniques ?  $2 + 3 + 7 + 3$
9. Define solid-state sintering. How does it differ from liquid-state sintering ? Discuss briefly different mass transport mechanisms during solid-state sintering.  $3 + 3 + 9$
10. Briefly discuss the tape casting of ceramic system with a sketch. How does tape casting differ from slip casting ? State the functions of binders, plasticisers and deflocculants in tape casting slurry. How does the drying of tape cast sheet take place ?  $6 + 3 + 3 + 3$
11. Briefly describe the hot pressing equipment with sketch. Why hot pressing is also known as pressure sintering ? Mention the processing and property related advantages of hot pressing. State the limitations of hot pressing.  $6 + 2 + 5 + 2$

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