

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (CT)/SEM-6/CT-605/2010**  
**2010**  
**PROCESS CERAMICS — II**

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.*

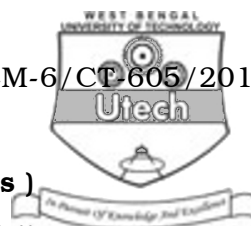
**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) Creep value at  $145^{\circ}\text{C}$  under  $4\text{ kg/cm}^2$  load of silica bricks for coke over as per DIN specification for 5 to 25 hrs is
    - a)  $\pm 0.12\%$
    - b)  $\pm 0.50\%$
    - c)  $\pm 1.0\%$
    - d) none of these.
  - ii) Which drying is followed for getting most fine particles ?
    - a) Tray drying
    - b) Flow drying
    - c) Spray drying
    - d) None of these.
  - iii) Suitable working lining of A.O.D. unit is
    - a) DBMC
    - b) High alumina
    - c) Burnt dolomite
    - d) None of these.



- iv) Suitable working lining of V.O.D. unit is
- a) Burnt magnesia                      b) DBMC
- c) Burnt dolomite                      d) None of these.
- v) Bricks used in working lining of torpedo ladle is made of
- a)  $\text{MgO-C}$                                       b)  $\text{MgO} - \text{Al}_2\text{O}_3 - \text{C}$
- c)  $\text{Al}_2\text{O}_3 - \text{MgO} - \text{C}$                       d) None of these.
- vi) Bricks used in lining of slag zone is
- a) Dolo – Carbon                      b)  $\text{Al}_2\text{O}_3 - \text{MgO} - \text{C}$
- c)  $\text{MgO} - \text{C}$                                       d) None of these.
- vii) Most suitable particle size range in monosize particles is
- a) 0.3 to 0.06  $\mu\text{m}$                       b) 0.3 to 10.0  $\mu\text{m}$
- c) 1 to 10  $\mu\text{m}$                                       d) None of these.
- viii) In normal hydraulic press, thrust is applied on the body
- a) from top                                      b) from top and bottom
- c) from all directions                      d) none of these.
- ix) Maximum packing density by two types of spheres achieved is
- a) 74% theoretical                      b) 62% theoretical
- c) 14.44% theoretical                      d) none of these.
- x) In grain boundary diffusion, the material is transported from
- a) Neck region to free surface region
- b) Free surface region to neck region
- c) Bulk region to grain boundary region
- d) None of these.



**GROUP – B**  
**( Short Answer Type Questions )**

Write short notes on any *three* of the following.

3 × 5 = 15

2. Comparison of soft and hard agglomerates.
3. Comparison of solid state and liquid state sintering.
4. Comparison of slip casting and fusion casting.
5. Comparison of green and sintered microstructure of a ceramic body.
6. Comparison of spray drying and spray roasting of ceramic powders.

**GROUP – C**  
**( Long Answer Type Questions )**

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

7. Define spinel. Discuss briefly how spinels are classified. Describe briefly how different refractory grade magnesium aluminate spinels are prepared in the plant. 2 + 5 + 8
8. Define cold isostatic pressing. How does it differ from normal unidirectional pressing ? Discuss briefly how High Alumina grinding media is manufactured in the plant. Mention different quality parameters during its production.

3 + 3 + 7 + 2



9. Define solid state sintering. Discuss briefly the driving force of solid state sintering. Calculate driving force of sintering when monosize ceramic powders of equivalent spherical diameter of 1 micron undergo solid state sintering. [Given surface free energy of the powder is  $1000 \text{ ergs/cm}^2$ ]

Calculate the number of spherical particles of radius 0.1 micron undergo grain growth to form a grain of radius 10 micron during sintering. 3 + 4 + 5 + 3

10. Define Sol-Gel technique for preparation of ceramic powders. How does it differ from precipitation/co-precipitation technique? Describe briefly how sub-micron ceramic powders are prepared by Sol-Gel technique? 3 + 4 + 8

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

- a) Tape casting.
- b) Morphological changes during solid-state sintering.
- c) Knezyński's sintering model
- d) sintering aids.
- e) Effect of pH on stoichiometry of  $\text{MgO} : \text{Al}_2\text{O}_3$  in  $\text{Mg Al}_2\text{O}_4$  precursor during co-precipitation.

=====