



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(CT)/SEM-4/CT-401/2010  
2010**

**CERAMIC RAW MATERIALS**

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**

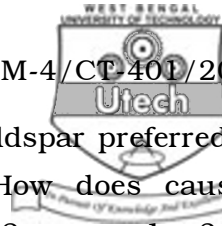
**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) Which clay mineral shows exfoliation on heating ?
    - a) Halloysite
    - b) Montmorillonite
    - c) Vermiculite
    - d) Chlorite.
  - ii) The unit formula of gamma alumina is
    - a)  $\text{Al}_8\text{O}_{12}$
    - b)  $\text{Al}_4\text{O}_6$
    - c)  $\text{Al}_2\text{O}_3$
    - d) none of these.
  - iii) Which is the microscopic view of materials ?
    - a) Particle
    - b) Grain
    - c) Crystallite
    - d) None of these.
  - iv) Which of the following transformation of  $\text{ZrO}_2$  is volume expansive process ?
    - a) Monoclinic to tetragonal
    - b) Tetragonal to cubic
    - c) Tetragonal to monoclinic
    - d) None of these.

- ### GROUP – B

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

- 2



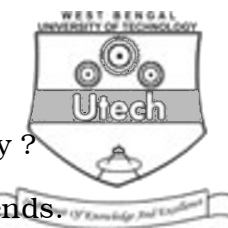
4. What is fluxing agent ? Why is potash feldspar preferred to soda feldspar in whiteware body ? How does caustic magnesia differ from dead burnt magnesia ? 1 + 2 + 2
5. Discuss the structural stability of  $\text{BaTiO}_3$  . How is nano-size  $\text{BaTiO}_3$  manufactured by modified Pachini process ? 2 + 3
6. Give a flowchart for preparation of  $\text{Y}_2\text{O}_3$  stabilized  $\text{ZrO}_2$  powder by precipitation technique. How c/t phase ratio would be increased ? 4 + 1

### GROUP – C

#### ( Long Answer Type Questions )

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

7.
  - a) Discuss the basic principle of Sol-Gel process.
  - b) What are the advantages and disadvantages of this process ?
  - c) Show the descriptive flowchart for manufacture of silica glass fibre from TEOS by sol-gel process.
  - d) Discuss the process variable of this synthesis. 4 + 4 + 4 + 3
8.
  - a) What are the precursors used for the preparation of MAH powder by solution precipitation techniques ?
  - b) Discuss the effect of calcination temperature and seeding technique on spinelization ?
  - c) How nano alumina is prepared from boehmite sol ?
  - d) What are the different routes for preparation of mullite powder by solution route ? 4 + 4 + 4 + 3



9. a) What is cation exchange capacity of clay ?  
 b) Mention the factors on which CEC depends.  
 c) Explain the different causes of CEC in clay.  
 d) Why is the CEC value of ball clay 15-40 meq/100 gms. whereas that of china clay is only 4-6 meq/100 gms although both belong to the same group ( kaolinite ) ?  
 e) Describe the method of measurement of CEC of clay.

2 + 2 + 6 + 3 + 2

10. a) Describe the displacive and reconstructive type of transformation in silica polymorphs.  
 b) Why quartzite is preferred in silica brick production whereas glass sand / quartz powder is preferred in glass melting ?  
 c) What is vitreous silica and how is it prepared ?  
 d) Mention the important applications of silica.

4 + 5 + 4 + 2

11. a) Name the different polymorphs of  $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ .  
 b) How do they differ from each other ?  
 c) State their important applications.  
 d) What is chromite ? Name the different types of chromite available in nature and their basic characteristics.  
 e) How can friable chrome ore be used as substitute for massive variety ?

2 + 2 + 2 + 6 + 3

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