Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(CT-OLD)/SEM-4/CT-402/2012

2012

PROCESS CERAMICS-I

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 × 1 = 10

   i) Ball mill should run at

      a) 20% – 30% of its critical speed

      b) 40% – 50% of its critical speed

      c) 65% – 80% of its critical speed

      d) none of these.

   ii) Which of the following factors controls the plasticity of ceramic material ?

      a) Particle size

      b) Particle size distribution

      c) Shape of the particle

      d) All of these

      e) Both (a) and (b).

iii) The chemical formula of Plaster of Paris is

a) $CaSO_4.2H_2O$

b) $CaSO_4.\frac{1}{2}H_2O$

c) $CaSO_4.H_2O$.

iv) Which one of the following shows dilatancy ?

a) Zircon b) China clay

c) Ball clay d) Smectite.

v) The value of zeta potential for stable suspension is

a) ± 0·05 volt b) ± 0·01 volt

c) ± 1·0 volt d) none of these.

vi) Vetrification takes place in firing of

a) refractory body production

b) bio-ceramic body preparation

c) dielectric ceramic production

d) whiteware body production.

vii) Which of the following oxides is not glass network former ?

a) B_2O_3 b) P_2O_5

c) GeO_2 d) CaO.

viii) Which statement is incorrect ?

a) Vitreous silica is an amorphous material

b) To ease filter pressing flocculated suspension is preferred

c) Sintering temperature should not be less than 2/3rd of melting temperature

d) Sanitary wares are dried in hot floor drier.

ix) Which of the following can be used as protective colloid ?

a) NaCl b) Na_2CO_3

c) NaOH d) Na_2SiO_3 .

x) Which of the following chemicals is used as refining agent for glass melting ?

a) CaO b) CoO

c) As_2O_3 d) Na_2CO_3 .

GROUP – B

(Short Answer Type Questions)

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

2. Give the modern defination of glass. Write down the approx. oxide composition of sheet glass, W-seal glass, Table ware and fibre glass. $3 + \left(4 \times \frac{1}{2} \right)$

3. Give the definition of plasticity. Briefly describe the three important factors to control plasticity of clay. 2 + 1 + 1 + 1

4. Neatly draw and explain the double layer formation of clay-water system. Define zeta ptential. 4 + 1

5. Describe the working principle of a spray drier with a sketch. What are the main advantages of spray dried granules ? 3 + 2

6. Name the different swaping processes used in ceramic system. How do they differ from each other ? Why is powder granulation essential before pressing ? $1\frac{1}{2} + 1\frac{1}{2} + 2$

GROUP – C
(Long Answer Type Questions)

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

7. Define black density, packing fraction and packing efficiency. Name the different types of porosity present in a ceramic body. How are they formed in a ceramic body ? Name the different ways of packing of unisize spherical particles mentioning their packing efficiency and co-ordination number. Why are graded materials desirable for ceramic processing ? 3 + 1 + 4 + 5 + 2

8. Describe different types of water present in a clay paste. Briefly state the drying mechanism of clay containing body. Give the names of diffferent methods of drying ? Discuss the working principle of humidity drier. Mention the types of defects introduced in pottery body due to incorrect drying practices. 3 + 4 + 1 + 4 + 3

9. Draw the specific volume *vs.* temperature plot of melt and locate the melting temperature of the crystals, glass transformation region and the fictive temperature. What is critical cooling rate ? State the different types of raw materials and their functions for the production of soda lime silica glass. Briefly describe the size specification and impurities permissible for glass sand for glass manufacturing. Also mention the problems with coarser or very fine sand.

10. Write short notes on any *three* of the following : 3 × 5
    a) Jiggering and jolleying
    b) Isostatic pressing
    c) Deairing pug mill
    d) Attrition mill
    e) Solid state sitering *vs.* liquid phase sintering.