Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CT-NEW)/SEM-4/CT-402/2012

2012

PROCESS CERAMICS

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) Atterberg number is related to

      a) total porosity b) water absorption

      c) strength d) plasticity.

   ii) Which of the following ions will be the best for helping flocculation of a slip ?

      a) Al^{3+} b) Ca^{2+}

      c) Na^{+} d) H^{+}.

   iii) Which of the following is not used as protective colloid ?

      a) Sodium chloride

      b) Sodium hexameta phosphate

      c) Sodium silicate.

iv) The maximum packing efficiency that can be attained practically in unisized spherical particles is

a) 74% b) 62%

c) 58% d) 68%.

v) To increase the brilliancy in tableware, which oxide is used ?

a) Na_2O b) K_2O

c) PbO d) MgO .

vi) Which one of the following is not a modifier for glass formation ?

a) Na_2O b) CaO

c) Li_2O d) Al_2O_3 .

vii) Drying is an important operation prior to firing for materials shaped by

a) slip casting b) semidry pressing

c) dry pressing d) isostatic pressing.

viii) Which statement is incorrect ?

a) Quartz-water shows dilatancy

b) Sanitary wares are dried in hot floor drier

c) Vetrification takes place during whiteware firing

d) Thixotropic suspension shows hysteresis loop.

ix) Ceramic capacitors are fabricated by

a) slip casting b) extrusion

c) semidry pressing d) dry pressing.

x) The following oxide reduces the working range of the glassmelt.

a) SiO_2 b) CaO

c) Na_2O d) B_2O_3 .

GROUP – B

(Short Answer Type Questions)

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

2. Define bulk density. Briefly discuss the different types of porosity in a ceramic body with sketches. How sealed pores are formed in a body ? 1 + 2 + 2

3. Draw and describe the specific volume as a function of temp. of a glass forming liquid and crystal forming liquid and locate melting temp., glass transition region & fictive temperature.

4. Briefly describe the mechanism of flocculation and deflocculation of clay-water system with neat sketch.

5. Define sintering. What are the driving forces for sintering.

2 + 3

6. Define plasticity. Briefly describe the direct and indirect methods of plasticity measurement of clay paste. 1 + 4

GROUP – C

(Long Answer Type Questions)

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

7. Name the different fabrication methods and their basic differences used in ceramic processing. Describe the working principle of spray drier with a neat sketch. Why granulation of powder is essential before pressing ? Point out the main advantages of isostatic pressing. 3 + 5 + 4 + 3

8. What are the main objectives of firing in ceramic processing ? Briefly describe the pre-sintering stages with proper examples. Give an idea of the different categories of sintering with important characteristics. Briefly narrate the mechanism of liquid phase sintering in presence of reactive liquid. 2 + 4 + (2 × 3) + 3

9. Give the modern definition of glass with examples. Name five important raw materials and their role in glass production. Define annealing range, working range and softening point on the viscosity *vs* temp. plot of $Na_2O - SiO_2 - CaO$ glass.

(3 × 1½) + 6 + (3 × 1½)

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

a) Deairing pug mill

b) Filter pressing

c) Refining of glass melt

d) Firing of triaxial body

e) Coarsening *vs* densification.

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