Name :	\ <u>\</u>
Roll No.:	
Inviailator's Signature:	

CS/B.TECH(CT)/SEM-6/CT-605/2012

2012 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) Alkali present in which technical Al_2O_3 available in the market is not removable by acid treatment?
 - a) αAl_2O_3
- b) βAl_2O_3
- c) γAl_2O_3
- d) None of these.
- ii) Most nano-materials are prepared by
 - a) Precipitation technique
 - b) Co-precipitation technique
 - c) Sol-Gel technique
 - d) Spray drying technique.
- iii) Sealed pores are the result of
 - a) Pore mobility < Grain boundary mobility
 - b) Pore mobility > Grain boundary mobility
 - c) Pore mobility = Grain boundary mobility
 - d) None of these.

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- iv) The porosity of the dried Colloidal gel is
 - a) 30 % 60 %
- b) 40 % 50 %
- c) 10 % 30 %
- d) 70 % 80 %.
- v) Sintering of Polymeric gel is performed in the range of
 - a) 800°C 1000° C
 - b) 1050° C 1170° C
 - c) 1200° C 1500° C
 - d) Above 1500° C.
- vi) Hard agglomerates are coarser, having
 - a) Less packing density; more firing shrinkage
 - b) More packing density; less firing shrinkage
 - c) Less packing density; less firing shrinkage
 - d) More packing density; more firing shrinkage.
- vii) Which of the following is/are prepared by Dry bag isostatic pressing and contour grinding?
 - a) Spark plug
- b) Insulators
- c) Oxygen sensors
- d) All of these.
- viii) For the particle size distribution (20 1) μ m, Grinding rate is
 - a) > 1.0

b) < 1.0

c) 1.0

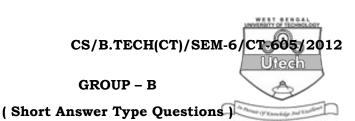
- d) < 0.7.
- ix) Suitable working lining of A. O. D. Unit is
 - a) High alumina
- b) Burnt magnesia

c) DBMC

- d) None of these.
- x) Which of the following is used for back up lining for LD Converter barrel zone and steel ladle slag zone?
 - a) MgO Cr_2O_3
- b) MgO C

c) MgO

d) $Al_2O_3 - ZrO2 - SiO_2$.



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

- 2. Describe morphological changes during solid state sintering.
- 3. Discuss briefly about mono-sized, mono-dispersed submicron ceramic powder.
- 4. Describe physical vapour deposition technique.
- 5. Discuss the effect of agglomeration of ceramic powders on sintering.
- 6. Differentiate between Colloidal gel and Polymeric gel.

GROUP - C

(Long Answer Type Questions)

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

- 7. a) Define Co-precipitation technique for preparation of ceramic powder.
 - b) Describe how co-precipitation technique is used to prepare Magnesio-Aluminate spinel.
 - c) Discuss the effect of pH on the composition of Magnesio-Aluminate spinel.
 - d) Why ceramic powders made by precipitation technique are usually agglomerated? 3 + 7 + 3 + 2
- 8. a) Define Sol-Gel technique for preparation of ceramic powder.
 - b) How does it differ from precipitation/co-precipitation technique?
 - c) Describe briefly how sub-micron ceramic powders are prepared by Sol-Gel technique.
 - d) Why ceramic powders prepared by sol-gel route give better sinter ability than that prepared by coprecipitation technique? 3 + 3 + 7 + 2

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- 9. a) Define solid state sintering.
 - b) Classify solid state sintering.
 - c) Calculate the number of particles of diameter 0.3 micron involved when they form bigger grain of diameter 3.0 microns.
 - d) A ceramic body has 3.0 gm/cc green density. During firing it gives sintered density 3.2 gm/cc. It shows firing weight loss of 4 wt. %. State whether the body will give shrinkage or expansion and also calculate the per cent linear expansion or shrinkage buring firing.

3 + 3 + 3 + 6

- 10. a) What is the condition to stop the secondary grain growth during later stage of sintering?
 - b) Define sintering additives.
 - c) How they differ from the green binders?
 - d) Calculate briefly the driving force of solid state sintering.

What are the differences between solid state sintering and liquid state sintering? 3 + 2 + 3 + 4 + 3

- 11. Write short notes on any *three* of the following: 3×5
 - a) Definition and difference of tape casting from ordinary slip casting
 - b) Hot and Cold Isostatic pressing
 - c) Spray drying
 - d) Comparison of soft and hard agglomerate.
 - e) Intermediate stage of sintering.
 - f) Grain boundary diffusion.

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