Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CT)/SEM-7/CT-703C/2010-11

2010-11

OXIDE 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.

Answer any *five* questions. 5 × 14 = 70

1. What do you mean by pure oxide ? How are pure oxides classified ? State some important properties of pure oxide. Describe in short the general methods of fabrication of pure oxide body. 1 + 3 + 4 + 6

2. Write short notes on the following : $4 \times 3\frac{1}{2}$

   a) Berillia

   b) Thoria

   c) Tin dioxide

   d) Mechanical properties of pure oxide.

3. Why ZrO_2 and ZrO_2 bearing oxides are used in metallurgical and high temperature chemical industries ? What are the structures exhibited by ZrO_2 and in what temperature are they stable ? In what ways are toughened ceramics developed ? Write in brief the properties of toughened ceramics. 2 + 3 + 4 + 5

4. How ZrO_2 is partially stabilized and why ? What are the applications of Zirconia ceramics ? 3 + 4 + 7

5. Discuss briefly how low soda containing (< 0·1 wt% Na_2O) alumina powders can be prepared in Bayer's process. What are reactive aluminas ? How do they differ from metallurgical grade technical alumina powders ? Discuss how technical alumina can be processed to make reactive alumina powders ? 5 + 2 + 3 + 4

6. What are the stoichiometric and non-stoichiometric magnesium aluminate spinels ? Discuss briefly how chemically pure (wt% $MgAl_2O_4$ > 99·8%) magnesium aluminate spinel bodies can be made in the laboratory. 2 + 2 + 10

7. Discuss briefly Al_2O_3 – MgO binary phase diagram. What are the important characteristics of this diagram ? Describe how this diagram can be utilised to make pure phase of $MgAl_2O_4 - Al_2O_3$ composition in the laboratory. 4 + 3 + 7