Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(CT-OLD)/SEM-6/CT-604/2013

2013
ADVANCED 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.

Answer any *seven* questions of the following : 7 × 10 = 70

1. What are cermets ? State the different factors affecting the strength of a cermet. Discuss in brief some important properties along with the major field of application. 1 + 5 + 4

2. What are the structural features of Graphite and how these features are related to its important properties ? Why greasy feel appears in Graphite ? Describe in brief the electrical and thermal properties of Graphite. 5 + 1 + 4

3. What do you mean by white graphite and Borazon ? How commercially very pure Born nitride in manufactured ? In what ways Si_3N_4 is manufactured ? 2 + 4 + 4

4. Describe in detail the methods of manufacturing of $MOSi_2$ including thermal nature of the process. Write the important applications and limitations of metal silicides. 6 + 4

5. What are the general methods of synthesis of Carbide ? What will happen if SiC as heating element is used above 1400°C ? Why SiC can be used as lightning arrester ? 4 + 4 + 2

6. a) Glass Lasers can be used for *Q*-switched application. Explain.

   b) Erbium doped glass Laser provides greater eye safety. Explain.

   c) Explain the working mechanism of Ruby Laser.

   3 + 2 + 5

7. a) β-alumina is used as electrolyte in Na-S cell. Explain.

   b) "NaSiCON" is a better alternative than β-alumina as solid electrolyte. Explain.

   c) Describe the property requirement of materials used as cathode, anode and electrolyte in SOFC with some examples. 4 + 1 + 5

8. a) Briefly explain the parameters that affect the wear-rates of ceramics in engineering application.

   b) Though Al_2O_3 is harder than ZrO_2, still ZrO_2 is better wear resistant material than Al_2O_3. Explain. 7 + 3

9. a) Discuss the advantage of Al_2O_3 ceramics as windows transmitting in the microwave spectrum.

   b) Discuss the advantages and disadvantages of glass ceramics for window application. 5 + 5

10. a) UO_2 and UC are better ceramic fuel than U. Explain.

    b) Boron carbide is used as control and BeO is used as moderator in nuclear reactor. Explain.

    c) Montmorillonite clays are suitable for disposing radio-active waste. Why ? 4 + 3 + 3