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CS / B.TECH (CT) / SEM-6 / CT-604 / 2011

2011

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.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Binder used for consolidation of $MoSi_2$ is

   a) Resin b) Cornflower with water

   c) PVA d) None of these.

   ii) Nitrides of Cr, Mo and W are not considered as refractory because of

   a) low M.P.

   b) high dissociation pressure at high temperature

   c) reduce easily

   d) none of these.

   iii) Sintering of cermet is usually carried out in

   a) oxidising atm b) reducing atm

   c) neutral atm d) none of these.

iv) In graphite % of disordered carbon is

a) 5% b) 15%

c) 25% d) none of these.

v) Mechanical properties of graphite improved at elevated temperature because of

a) oxidation b) reduction

c) increase disorderness d) increase orderness.

vi) Which of the following types of fuel cell has the maximum efficiency ?

a) Si_3N_4 b) SiC

c) BN d) TIC.

vii) Which of the following carbides has the highest melting point ?

a) WC b) ZrC

c) Hf C d) TIC.

viii) White graphite is

a) TIC b) BN

c) AlN d) B_4C.

ix) Which of the following materials has very low value of thermal expansion ?

a) α -SiC b) ZrB_2

c) WC d) ZrC.

x) For metallization of ceramic surface at normal temperature which of the following metals is used ?

a) Ti b) Mo

c) Ag d) Ti.

GROUP – B

(Short Answer Type Questions)

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

2. a) UO_2 is a better nuclear fuel than U. Explain.
   b) "Montmorillonite clay can be used for the disposal of radioactive waste." Explain.
3. a) Explain the difference between Bio-inert and Bio-active materials.
   b) Calcium phosphate ceramic are widely used as Bioceramic. Explain.
4. a) "Mn is used as an active metal in the metallization of Al_2O_3 surface by Mo." Explain.
   b) "For low temperature metallization of ceramics Ag is widely used." Explain.
5. What will happen if SiC is used as heating element > 1400°C ? What are the growing field of application of SiC ? 3 + 2
6. Briefly discuss the synthesis method of production of Si_3N_4 body.

GROUP – C

(Long Answer Type Questions)

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

7. a) Briefly explain the mechanism of fuel cell indicating the choice of materials as cathode, anode, electrolyte and their connection.
   b) Briefly describe the structure of Li-ion battery with choice of materials for different components. 8 + 7

8. Discuss the parameters that affect the wear of ceramics. Give some examples of wear application of ceramics, indicating the choice of materials for such applications. 10 + 5

9. a) Explain the working mechanism of Ruby Laser. Discuss the advantages and disadvantages of crystallisation Laser and Glass Laser.

   b) Explain the working principle of Fibre optics. Give examples of some materials used in the fabrication of optical fibres. 8 + 7

10. What do you mean by cermet ? In what ways cermets are differ from traditional refractories ? What factors will you consider for compiling a cermet composition ? Write the applications of cermets ? How many types of cermets are there ? 1 + 3 + 6 + 3 + 2

11. Why Sialon ceramics developed ? How many types of Sialon exist ? Is there any difference between the different forms ? If so, discuss in detail. What are the methods used for consolidation of sialon ? What are the sintering aid used during sintering of sialon ceramics ? 2 + 2 + 1 + 6 + 2 + 2

12. What do you mean by graphite carbon ? Why does greasy feel appear in graphite ? Describe in brief the electrical, thermal oxidation and corrosion properties of graphite. What do you mean by white graphite and borazone ? 1 + 3 + 8 + 3

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