Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CT)/SEM-6/CT-601/2012

2012

REFRACTORIES – 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 in self flow castable is

   a) *CA*-cement b) Microfine silica

   c) Colloidal silica d) none of these.

   ii) Drying aid in castable refractory is

   a) ORF b) SSF

   c) SHMP d) none of these.

   iii) Thermal shock resistance is higher in castable refractories than shaped refractories because of

   a) lower porosity b) higher density

   c) higher porosity d) none of these.

   iv) Binder used in NCC is

   a) α - Al_2O_3 b) β - Al_2O_3

   c) ρ - Al_2O_3 d) Zeta - Al_2O_3 .

v) Addition of microfine silica in basic castable is detrimental because of
   a) increase flow property
   b) decrease flow property
   c) increase low melting phases
   d) none of these.

vi) How many Eutectics are in $MgO\text{-}Al_2O_3$ system ?
   a) One b) Two
   c) Three d) Four.

vii) The 'Serpentine' is
   a) $MgO.SiO_2.H_2O$ b) $MgO.2SiO_2.2H_2O$
   c) $3MgO.2SiO_2.2H_2O$ d) $MgO.3SiO_2.H_2O$.

viii) What is the temperature of 'CO' disintegration test ?
   a) 400 °C b) 450 °C
   c) 500 °C d) 550 °C.

ix) Which oxide promotes the growth of periclase during burning of magnesite ?
   a) B_2O_3 b) Fe_2O_3
   c) SiO_2 d) CaO.

x) For unfired chemical bonded magnesite bricks, the binder used in
   a) $CaSO_4$ b) $Al_2(SO_4)_3$
   c) $MgSO_4$ d) K_2SO_4.

GROUP – B

(Short Answer Type Questions)

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

2. What are the materials added in castable refractories as drying aid ? How they help in drying ? 2 + 3
3. What are the advantages and disadvantages of unshaped refractoreis over shaped refractories ?

4. What type of heating schedule of flows to avoid cracking or spalling of the installed lining of the castable refractories ?

5. In which form may carbon exist in BOP brick after service ? Illustrate the effect of residual carbon in BOP bricks of both pitch bearing and non-pitch bearing refractories. 2 + 3

6. Illustrate the effect of pitch content and softening point in the residual carbon content of impregnated basic brick used in BOP process. Compare the effect of pitch content on hot compressive strength of pitch-bonded and tempered bricks.

2½ + 2½

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. Mention the raw materials for producing BOP bricks with reference to CaO-MgO phase diagram. Describe the method of producing periclase from sea water. What is done to obtain various chemical qualities of grain products of periclase ? Discuss the importance of carbon in BOP refractories.

4 + 6 + 5

8. a) Discuss why 'MgO-spinel-C' bricks offer better performance and improved slag resistance than MgO-C bricks in ladles of secondary metallurgical operation.

   b) What are the additives used in high performance MgO-C bricks ? Discuss their functions.

   c) Discuss melting behaviour of basic refractories in respect of

      i) influence of lime-slilca ratio

      ii) influence of Al_2O_3-Fe_2O_3 and Cr_2O_3

      iii) influence of B_2O_3. 2 + 4 + 9

9. What are the ramming Mixes ? How is it installed and where it is used ? What are the advantages of ramming mixes ? What are the binder used in ramming mixes ? What should be the bonding characteristics of ramming mixes ?

2 + 3 + 2 + 2 + 2 + 4

10. Write short notes on any *three* of the following : 3 × 5 = 15

    a) Gunning mixes

    b) Insulating castables

    c) Basic castables

    d) Bonding in castable refractories.

11. Name the aggregate and binder materials usually used in the conventional castables and discuss their roles towards the properties of a castables. Define 'gel-bonded' and 'ultra-low-cement' castables. "Workability of a low moisture low cement castables can be improved by restricted amount of specific deflocculants." Explain in brief. 3 + 4 + 4 + 4

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