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CS/B.Tech(CT)/SEM-5/CT-501/2009-10

2009

REFRACTORIES - I

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 any *ten* of the following : 10 × 1 = 10

i) Firing schedule of silica bricks is

a) one day b) two days

c) three days d) none of these.

ii) Green binder used in making burnt dolomite bricks is

a) Dextrine b) Paraffin

c) Molasses d) none of these.

iii) Silica content of Direct Bonded Mag-Chrome bricks is

a) more than 6% b) ≥ 3 wt%

c) < 1wt% d) none of these.

iv) Standard dimension of Blast-furnace bottom block is

a) 460 × 230 × 115 mm b) 200 × 100 × 50 mm

c) 300 × 150 × 100 mm d) none of these.

v) $Fe_2 O_3$ content of Brown Fused Alumina is

a) ≥1 wt % b) 0·4 to 0·6 wt %

c) < 0·1 wt % d) none of these.

vi) Molecular formula of andalusite is

a) $2Al_2 O_3 \cdot SiO_2$ b) $3 Al_2 O_3 \cdot 2SiO_2$

c) $Al_2 O_3 \cdot SiO_2$ d) none of these.

vii) Sealed pores present in white Tabular Alumina is

a) ≤ 1 % b) 2 to 3 %

c) 4 to 8% d) none of these.

viii) Vacuum seal packing is used for packaging of

a) Silica bricks b) DBMC bricks

c) Dolomite bricks d) none of these.

ix) V.O.D. working lining of slag zone contains

a) High alumina bricks b) Burnt magnesia bricks

c) DBMC bricks d) none of these.

x) Usual forming pressure of moulding of DBMC bricks is

a) 1000 kgs/cm ^{2} b) 3000 kgs/cm ^{2}

c) 1800 kgs/cm ^{2} d) none of these.

xi) To make Dolo-Sinter, Dolomite is sintered in a rotary kiln at

a) ~ 1000°C b) ~ 1500°C

c) ~ 1800°C d) none of these.

xii) Most suitable refractory used in A.O.D. working lining is

a) Burnt Magnesia bricks

b) DBMC bricks

c) Burnt Dolomite bricks

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Discuss briefly why Indian Magnesite is not suitable for making MgO–C bricks for critical applications.

3. Discuss briefly the advantages and disadvantages of white Fused Alumina over white Tabular Alumina.

4. Discuss briefly why andalusite is preferred as better refractory raw material than kyanite in making High Alumina bricks.

5. What are Flat and Edge pressings ? State some of their advantages and disadvantages.

6. State the refractory properties of Silica bricks suitable for Coke Oven application.

GROUP – C

(Long Answer Type Questions)

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

7. What are H.A refractories ? Name some of their important raw materials. A customer has following specifications :

   Al_2O_3 — 45 wt % (min), Fe_2O_3 — 1·4 wt % (max)

   B.D. — 2·35 gms / c.c. (min),

   R.U.L. (ta) — 1520°C (min).

   Name the raw materials and their proportations to make the above bricks. Discuss briefly how these bricks are produced in the plant. 2 + 2 + 2 + 3 + 6

8. Define Dolomite and Doloma. State some of the important properties of Doloma. Discuss briefly how Burnt Mag-Dolomite bricks are produced in the plant. State some important properties of burnt dolomite bricks. $2 \times 1\frac{1}{2} + 3 + 6 + 3$

9. Define the terms B.D., % A.P, A.S.G. and T.S.G. of a refractory brick. Discuss briefly how % T.P. of a refractory brick can be determined in the laboratory. At what condition % T.P. of a refractory brick will be identical to its % A.P. ?

$4 \times 1\frac{1}{2} + 7 + 2$

10. Define DBMC brick. How does a DBMC brick differ from a conventional Mag-Chrome brick ? Discuss briefly how DBMC bricks having following specification can be produced in the plant :

% $Cr_2 O_3$ — 18 wt % (min), SiO_2 — 1·0 wt %

% A.P. — 18 (max) C.C.S — 500 kgs/cm ^{2} (min) and R.U.L (ta) — 700°C (min).

State some of its important applications. $2 + 3 + 7 + 3$

11. Write short notes on any *three* of the following : 3×5

a) Firing schedule of Silica bricks for coke oven application.

b) Synthetic refractory raw materials *vs* natural refractory raw materials.

c) Refractoriness under load and its determination in laboratory.

d) Natural DBM *vs* sea-water DBM.

e) Raw materials for burnt magnesia bricks.