



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH(CT)/SEM-5/CT-501/2011-12**

**2011**

**REFRACTORIES - 1**

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 × 1 = 10

i) In H.A. refractories impurity present is

- |                   |                            |
|-------------------|----------------------------|
| a) $\text{SiO}_2$ | b) $\text{Fe}_2\text{O}_3$ |
| c) $\text{ZrO}_2$ | d) None of these.          |

ii) In H.A. refractories most detrimental impurities are

- |  |
|--|
| a) combination of $\text{TiO}_2$ and $\text{Na}_2\text{O}$ |
| b) $\text{Fe}_2\text{O}_3$                                 |
| c) $\text{Na}_2\text{O}$                                   |
| d) none of these.  |



- iii) In refractories PCE value is always
- a) greater than RUL (ta) value
  - b) less than RUL (ta) value
  - c) equal to RUL (ta) value
  - d) none of these.
- iv) Refractories used in working lining of B.F. is
- a) H.A.
  - b) Magnesite
  - c) Dolomite
  - d) none of these.
- v) Molecular formula of mullite is
- a)  $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$
  - b)  $2\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$
  - c)  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$
  - d) none of these.
- vi) Chinese calcined bauxite in H.A. refractories is preferred because it contains
- a) high  $\text{Fe}_2\text{O}_3$  and low  $\text{Al}_2\text{O}_3$
  - b) low  $\text{Fe}_2\text{O}_3$  and high  $\text{Al}_2\text{O}_3$
  - c) high alkali
  - d) None of these.
- vii) Burnt magnesite bricks have
- a) good corrosion resistance against basic slag
  - b) good spalling resistance
  - c) both good corrosion resistance against basic slag and good spalling resistance
  - d) none of these.



- viii) Temporary binder used in burnt dolomite brick making is
- Dextrine
  - Carboxy methyl cellulose
  - PVA
  - none of these.
- ix) In copper metallurgy, DBMC bricks have
- better corrosion resistance
  - better spalling resistance
  - both better corrosion resistance and better spalling resistance
  - none of these.
- x) In V.O.D., suitable refractory used is
- burnt magnesite
  - burnt dolomite
  - DBMC
  - none of these.

### GROUP – B

#### ( Short Answer Type Questions )

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

- What are white fused alumina and white tabular alumina ? State their differences in refractory properties.  $2 + 3$
- Define % A.P. and % T.P. of a refractory. Which one is more important and why ?  $2 + 3$
- Define aggregates and matrix of refractory product mix. Why properties of matrix are important in determining refractory properties ?  $2 \frac{1}{2} + 2 \frac{1}{2}$
- Discuss briefly physicochemical properties of Dead Burnt Magnesite ( DBM ) used in making basic refractories.
- State the differences between sintered DBM and fused DBM used for making refractories. Why Indian DBM is not suitable for making advanced basis refractories ?  $3 + 2$



**GROUP – C**

**( Long Answer Type Questions )**

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

7. What are sillimanite group of minerals ? How do they differ ? Discuss briefly how they are used in H.A. refractory product mixes ? Which one is best in H.A. brick making and why ? Why one member is not used in coarser fraction ?

$2 + 3 + 5 + 3 + 2$

8. Discuss briefly how a customer's requirements in the form of following specification can be converted into H.A. refractories :

Wt%  $\text{Al}_2\text{O}_3$  – 70 ( min ),  $\text{Fe}_2\text{O}_3$  – 1.5 wt % ( max ),  
B.D. – 2.55 gms/c.c. ( min ), c.c.s. – 560 kgs /  $\text{cm}^2$  ( min )  
and RUL ( ta ) – 1600°C ( min )

State the process norms. How differential product mix concept can be used in this case ?

$8 + 3 + 4$

9. Define DBMC Refractories. How do they differ from conventional Mag-Chrome Refractories ? Discuss briefly the properties of different raw materials used in making DBMC bricks. State some properties and applications of DBMC bricks.

$2 + 3 + 5 + ( 2 \times 2 \frac{1}{2} )$

10. Define dolomite. How does it differ from doloma ? Discuss briefly with process flow diagram how burnt dolomite bricks are produced in the plant. What is vacuum seal packing and why is it needed for packing of dolomite bricks ?

$2 + 2 + 8 + 2 + 1$

11. Write short notes on any *three* of the following :  $3 \times 5$

- Silica bricks for coke oven batteries
- RUL and its importance in refractory properties
- Flat pressing and Edge pressing
- Calcined bauxite as refractory raw material
- Mag-dolo refractories and zone lining concept for cost effective lining.

