



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH/CT(N)/SEM-5/CT-501/2012-13**

**2012**

**REFRACTORIES TECHNOLOGY**

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 silica refractories is

- |             |                   |
|-------------|-------------------|
| a) CaO      | b) MgO            |
| c) $Y_2O_3$ | d) None of these. |

ii) Sp. Gravity of Quartz is

- |         |                   |
|---------|-------------------|
| a) 2.27 | b) 2.33           |
| c) 2.65 | d) none of these. |

iii) Drying aid used in castable refractories is

- |               |                   |
|---------------|-------------------|
| a) SSF        | b) ORF            |
| c) Sic-powder | d) None of these. |

iv) Cement content in LCC is

- |            |                   |
|------------|-------------------|
| a) 1-2 %   | b) 5-8 %          |
| c) 15-20 % | d) None of these. |

- 5030(N)



**GROUP – B**

**( Short Answer Type Questions )**

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

2. What is the common impurity present in the raw material of silica refractories ? Why ferruginous substances are not added in large quantities as mineralizers in silica refractories ? 1 + 4
3. What are the advantages and disadvantages of castable refractories over shaped refractories ?
4. Draw the  $\text{Al}_2\text{O}_3$ - $\text{SiO}_2$  phase diagrams showing mullite as a
  - i) congruently melting compound
  - ii) an incongruently melting compound and mark the temperature and phase fields.  $2 \frac{1}{2} + 2 \frac{1}{2}$
5. Discuss the desirable properties of a pitch for use in Basic Oxygen Process (BOP) brick.
6. Compare the features of Basic Oxygen Process (BOP) in contrast to Open Hearth (OH) process of steel making. Briefly discuss with sketches typical changes in slag composition with oxygen blowing time. 2 + 3

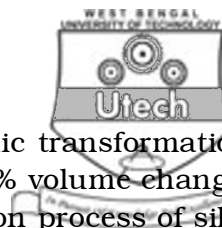
**GROUP – C**

**( Long Answer Type Questions )**

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

7. What are castable refractories ? Why mechanical strength of conventional castable is temperature dependant ? What are the drawbacks of conventional castables ? What are the advantages of L.C.C. and where are they used ?

1 + 3 + 3 + 5 + 3



8. Write with a neat diagram, the polymorphic transformations of 'silica' mentioning the temperature and % volume changes. Discuss with a flow diagram, the production process of silica refractories and also mention the changes occurring during firing of silica bricks.  $5 + 5 + 5$
9. What do you understand by high-alumina refractories ? What are the raw materials generally used for manufacture of high-alumina refractories ? How mullite refractories are fabricated and where they are used ?  $2 + 2 + 7 + 4$
10. In which test, refractoriness of a material is determined ? Describe the testing methodology in detail with sketches where necessary. What do you understand by carbon monoxide disintegration and creep ?
11. a) How do you define refractories ? Discuss the classification of refractory materials taking into various considerations like nature of raw materials, method of fabrication, properties, shape etc.
- b) Discuss briefly about carbon containing basic bricks. Do you think additives are required to improve the performance of carbon-containing bricks in steel-making industries ? If yes, discuss why do you need and what are the materials and their course of action.  $2 + 4 + 4 + 5$
12. Discuss the various sources of magnesite for the manufacture of magnesia refractories. Which constituents do affect the quality of magnesia refractories and how ? Narrate selection criteria of various rawmaterials for production of magnesia refractories. Discuss the method of preparation of sea-water magnesia. Draw the MgO-CaO phase diagram, mark the phase fields and show the regions of different basic refractories in the diagram.  $2 + 3 + 3 + 4 + 3$
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