Code No: 07A40602 **R07** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
FUELS FURNANCES AND REFRACTORIES
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How are the coals classified according to the order of age of coalification? Explain them in detail.
   (b) Write short notes on the following:
      i. Flexibility of a fuel
      ii. Grading of coals. [8+8]
2. (a) Discuss the various specifications of indian metallurgical cokes.
   (b) What is the purpose of puliverization of a fuel? Explain. Describe the characteristics of puliverized fuels.
   (c) Describe the constructional details of Beehive-oven. [5+6+5]
3. (a) What are insulating refractories and how are they produced?
   (b) Mention the applications of graphite refractories. [10+6]
4. (a) What is Fourier's law of heat conduction. Derive an equation for the rate of heat transfer in case of composite cyclindrical wall in steady state.
   (b) An important property of matter is defined by Fourier's law. What is it? What is its physical significance? What are its units. [12+4]
5. (a) Explain the treatment that the coke oven gas is subjected to recover the by products before it is used as a fuel gas.
   (b) List out various gaseous fuels and state their advantages and disadvantages. [8+8]
6. (a) What is the first step involved in the production of magnesite refractories.
   (b) With a flow sheet explain the various steps involved in the production of magnesite refractories. [6+10]
7. (a) Write a note an "liquid and gaseous fuel burners".
   (b) Discuss the factors affecting the coke oven gas. [8+8]
8. Draw the following furnaces and indicate the refractories used for various parts of the furnaces.
   (a) Iron blast furnace
   (b) Cupola. [8+8]

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Code No: 07A40602 **R07** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
FUELS FURNANCES AND REFRACTORIES
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the effect and importance of the following on the assessment of coal sample.
   (a) Moisture
   (b) Volatile matter
   (c) Ash
   (d) Fixed carbon. [16]
2. (a) Discuss the important properties of refractories.
   (b) What are cermets? Give their applications. [10+6]
3. Explain the various reactions that take place in the following zones during the manufacture of producer gas.
   (a) Oxidation Zone
   (b) Reduction Zone
   (c) Distillation Zone. [16]
4. (a) Calculate the volume of air needed for the complete combustion of 1kg of carbon.
   (b) Convert the following composition from volume percent to mass percent CO_2 = 11%, CO=1%, O =8%, N_2 = 80% [8+8]
5. What are the main types of plants used for puliverising of coal. With neat sketches, explain any two of the processes in detail. What are their relative advantages, disadvantages and applications? [16]
6. (a) Explain the various terms in the following heat conduction expression $dq = -kA.\frac{dt}{dx}$
   (b) The rate of heat transfer through a brickwall (K=0.69 w/m. k) 35 cm thick is found to be 50w/m^2. Estimate the temperature drop in the wall in steady state conditions. [7+9]
7. Compare the refractoriness, RUL, CCS and Chemical activity of fireclay, silica, magnestie & chromite refractories. [16]
8. With a neat sketch of the dilatometer explain the method of determining the linear changes in the refractories. [16]

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Code No: 07A40602 **R07** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
FUELS FURNANCES AND REFRACTORIES
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. With suitable figures showing the application of load, explain the method of determining the modulus of rupture of the refractories. [16]
2. (a) Discuss the charecteristics of dolomite.
   (b) What are the properties of chrome-magnesite refractories. [8+8]
3. (a) Give the classification of refractories based on the Chemical-mineralogical analysis. Give examples
   (b) Discuss the thermal spalling and structural spalling in refractories. [6+10]
4. (a) Write an account of the different types of gaseous fuels and their domestic/ industrial uses.
   (b) Compare and contrast 'watergas' and producer gas. [8+8]
5. (a) Explain how to select coal for a particular application.
   (b) Explain about commercial types of coals. [10+6]
6. (a) Give the composition of different types of coals relating to proximate analysis and ultimate analysis.
   (b) Discuss the characteristics and properties of sub bituminous coal. [8+8]
7. (a) Discuss the following with respect to coke making process
      i. Washing of coal
      ii. Use of coal briquettes
   (b) Discuss the various stages of conversion of coal into metallurgical coke in a coke oven. [10+6]
8. (a) Derive an expression for the shape factor in case of radiation exchange between two surfaces.
   (b) What is meant by thermal contact resistance? Upon what parameters does this resistance depend? Explain. [10+6]

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Code No: 07A40602 **R07** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
FUELS FURNANCES AND REFRACTORIES
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is meant by the term one-dimensional when applied to conduction problem? Explain.
   (b) What do you mean by thermal resistance? Discuss.
   (c) Write down the expression for thermal resistance of a wall, and annual cylinder and spherical shell. Explain the same. How does thermal resistance depend upon the area of heat transfer. [4+4+8]
2. (a) What are the imporatnt applications of pulverised coal? Explain.
   (b) Explain the properties of coke. [7+9]
3. Explain about the following two types of analysis of coal
   (a) Proximate analysis of coal
   (b) Ultimate analysis of coal. [8+8]
4. (a) Explain how oil deposits are detected.
   (b) Give the general composition of petroleum.
   (c) Into how many varieties petroleum is classified? What are they? Explain them. [5+4+7]
5. Discuss the method of production of chrome-magnesite refractories. [16]
6. (a) Calculate the mass of air required per kilogram of the oil if 20 percent excess air is used for combustion. The oil contains 85 percent carbon and 15 percent hydrogen.
   (b) Also calculate the percentage composition (by mass) of dry products of combustion. [6+10]
7. (a) Discuss the factors on which the choice of refractories will dependent upon.
   (b) Explain slip casting. [10+6]
8. Mentioning the conditions prevailing in the furnaces, indicate the refractories to be used for the following furnaces:
   (a) Copper converter
   (b) LD converter [8+8]

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