RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR [2014-17]

B.A./B.Sc. THIRD SEMESTER (July – December) 2015

Mid-Semester Examination, September 2015

Date : 14/09/2015 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11 am – 1 pm Paper : III Full Marks : 50

[Use a separate answer book for each group]

Group – A

1. Define the following terms (**any four**) : [4×1]
   a) Refractoriness
   b) What is a high duty brick?
   c) Name two neutral refractories.
   d) Who discovered cement and why is it called Portland Cement?
   e) What are Puzzlona Cements?
   f) Name two water proofing agents added to make water-proof cements.
   g) What is the approximate composition of fire clay?

2. Answer **any three** : [3×2]
   a) Explain the classification of refractories with one example to each type.
   b) Write short notes on Pyrometric Cone Test.
   c) What do you understand by the following terms used in refractory industry. (**any two**) :
      i) Thermal spalling
      ii) Porosity
      iii) Dimensional stability
      iv) Chemical inertness
   d) What are cermets? Give their properties and uses.
   e) Write short notes on Monolithic Bricks.
   f) What is Plaster of Paris? Write its uses. What is the function of Gypsum in cement manufacturing?

Answer **any two** : [2×5]

3. a) Explain the 'Wet Process' for the manufacture of Portland Cement. [3]
   b) What is the difference between 'wet process' and 'dry process' of cement manufacture? [2]

4. a) What are the different steps involved in the manufacture of Refractory brick? [3]
   b) How is Silicon Carbide brick manufacture? Give its properties and uses. [2]

5. a) Explain the selting and hardening of Portland cement. Give the chemical reactions involved in it. [3]
   b) What is a slag cement? How is it manufactured? [2]

6. Write notes on :
   a) Concrete and Reinforced concrete construction (R.C.C) [2·5]
   b) How is fire clay brick prepared? Give its properties and why is it widely used? [2·5]

Group – B

Answer **any three** : [3×5]

7. Define the term— "Fuel". 50lbs of water at 92°F was heated to 212°F. Calculate the quantity of heat required in BTU and KCal (Kilo calorie).Calculate quantity of heat generated when Diesel Fuel ($C_{16}H_{34}$) undergoes complete combustion. Heats of combustion of C and H are 8137 Cal/g and 34500 Cal/g respectively. [1+2+2]

8. Write notes on Peat, Lignite and Anthracite high lighting origin, composition, calorific value and end use. [5]

9. What is proximate analysis of coal? The following data are available for a sample of coal mined from Bararee Colliery, Jharkhand. Moisture – 1·6%, Ash – 15·7%, volatile matter – 27·8% Calculate ash content on dry basis and volatile matter on dry and ash free (daf) basis. [1+4]

10. Describe with a neat sketch Lurgi-Spiil Process of Low temperature carbonisation. Mention chemical composition of LTC gas. Is any such unit situated in West Bengal? [5]

11. What is metallurgical coke? Name the process by which it is manufactured in Plant attached to Steel Factories. Mention temperature and time required in this process. Describe the major fractions of HT-Tar distillate mentioning their boiling range and chief constituents. [1+1+3]

Group – C

12. Answer **any three** : [3×5]

    a) What is coordination number? Find out packing efficiency for bcc and fcc crystal? [1+4]

    b) What is delta ferrite? Write down eutectic reaction and eutectoid reaction for Fe-C system. [1+4]

    c) Draw (121) plane in a simple cubic system? What is Bravice Lattice? What is linear density? [2+1·5+1·5]

    d) Describe Hall-Heroult process? How lead and Zinc are extracted by ISP process? [2+3]

    e) "Phase diagram is drawn by Gibbs free energy concept"-explain with proper diagram. [5]

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