RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.SC. THIRD SEMESTER (July – December), 2012

Mid-Semester Examination, September 2012

Date : 10/09/2012 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 2 pm – 4 pm Paper : III Full Marks : 50

[Use Separate Answer Script for each Group]

Group – A

1. Classify the materials & mention two important properties of each category. [1+2]
2. Mention the particular fields where the following materials are used (**any two**). [1×2]
   a) Si
   b) Ge
   c) Be & Ti
   d) Na-K alloy
3. a) Define & correlate lattice, crystal structure & basis? [1+2]
   b) What is unit cell? Give the lattice parametric representation of a rhombohedral unit cell. [1+1]
4. Why FCC & HCP are called close packed structures? Calculate the APF of BCC unit cell. [1+2]
5. Copper(Cu) has an atomic radius of 0.128 nm, an FCC crystal structure, and an atomic weight of 63.5 g/mol. Compute its theoretical density . [4]

   OR

   What are line defects? Classify line defects. [2+2]
6. Describe the Bayer's process for preparation of alumina. [5]

   OR

   Give the temp effect on the polymorphic transformation of quartz & tridymite. [5]
7. Why Na- feldspar is used in glass industry? [2]
8. Write the setting mechanism of cement. [3]
9. Calculate the total wt% of CaO and SiO_2 in the Portland cement. Given, Wt% of:
   C3S= 45, C2S= 27, C3A= 11, C4AF =8, Others =9
   & atomic wts of Ca=40.08, Al=26.98, Si=28.09, O= 16.00, Fe= 55.85 [3]

Group – B

(*Answer **all** questions)*

10. Briefly Describe the making of Pig Iron in Blast Furnace. [4]
11. Indicate the advantages and disadvantage of extraction of metals by pyrometallurgy, Hydro metallurgy and Electro-metallurgy. [3]
12. Write Short notes on **any two** of the following : [3]
    i) Iron Carbon diagram
    ii) Ellingham Diagram
    iii) Phase Rule

Group – C

(*Answer **any two** questions*)

13. Describe with neat sketch Lurgi-Spül Low temperature carbonisation of bituninous coal. [5]

14. Write short notes on— [2½×2]
    (a) Peat (b) Charcoal

15. a) What is meant by 'gross' and 'net' calorific value of a Fuel?
    b) Deduce the formula :
    $C_G - C_N = 53H$ [2+3]

16. Proximate analysis of a Ranigange coal sample is :
    Moisture 3 PC, Ash 20 PC, Volatile matter 30 PC.
    Calculate volatile matter (% dmmf) and ash (% dry basis). [2½×2]

17. a) A Fuel gas from a Naphtha cracker unit in a petroleum Refiniery was analysed with following results, volume%, at STP.
    Moisture – 2, H_2 – 15, CH_4 – 3, C_2H_4 – 0·8, C_4H_8 – 1·8, rest being CO_2,, CO and N_2
    Calculate difference between gross and net C.V.
    b) A compressed Natural gas from Bombay High off-shore drilling contains 80% Methane, 14% Hexane and 6% Nitrogen at STP (by volume).
    Calculate the difference between gross and net CV. [2½×2]