RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [2016-19]

B.A./B.Sc. THIRD SEMESTER (July – December) 2017

Mid-Semester Examination, September 2017

Date : 12/09/2017 **INDUSTRIAL CHEMISTRY (Honours)**

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

[Use a separate Answer Book for each group]

Group – A

(*Answer **any four** questions*) [4×5]

1. a) Classify the different kind of materials with examples. [3]
   b) The average degree of polymerization of PVC is 2000. Calculate its average molecular weight in g/mol. [2]

2. Describe necessary design and selection of materials for a transparent photodiode used for solar energy conversion. [5]

3. Find out the packing fraction of a FCC and HCP system. [5]

4. a) Write a note on composite material. [2]
   b) The volume fraction of epoxy resin in a glass fiber/epoxy composite is 0·46. The density of glass fiber and composite are 2540 Kg/m^3 and 1950 Kg/m^3 respectively. The weight fraction of fiber in the composite is _____. [3]

5. Draw different unit cells for seven crystal system. [5]

Group – B

(*Answer **any six** questions*) [6×5]

6. Name three important glass forming systems. With the help of volume temperature diagram state the evolution of glassy state and significance of glass transition temperature. Cite the parameters on which glass transition temperature is dependent. [1+3+1]

7. State Zachariasen's rules applicable for glass forming oxides. How glass forming character of inorganic oxides changes with its single bond strength? Explain with examples. How glass viscosity changes with temperature of glass melt? [2+2+1]

8. a) Write chemical composition of following glasses [3]
      i) Flint glass (ii) Fibre glass (iii) Bioglass
   b) Determine the ratio of O : Si ions when 12% by weight of B_2O_3 is added to SiO_2. [2]

9. a) Draw and explain the alumina-silica phase diagram and mention the mullite formation region. [3]
   b) Why SiC cannot be used as heating element above 1400°C? [2]

10. a) What is refractoriness? [1]
    b) Write a short note on Silica refractories. [4]

11. a) What do you mean by RUL? [1]
    b) Write the importance of XRD analysis for refractory technology? [2]
    c) Write a short note on Thermal Spalling? [2]

12. a) Why little gypsum is used in Portland cement? [1·5]

b) Write the difference between sulphate resisting Portland cement and OPC. [2]

c) Write the factors which are influencing the hydration reaction of cement. [1·5]

13. a) Write a short note on flash setting of cement. [2·5]

b) Write a short note on reactions occurs in rotary kiln. [2·5]

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