

This question paper contains 3 printed pages.]

4326

Your Roll No.

M.Tech. / Sem. III **A**
**CHEMICAL SYNTHESIS AND PROCESS
TECHNOLOGIES**

Paper Module – 22 : Industrially Important Solids
(Admission of 2008 and onwards)

Time : 2 Hours

Maximum Marks : 38

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Answer all questions of any **three** parts.*

Part I

- A (06) Discuss the origin of the pH dependent and independent acidic sites in clay minerals?
- B (06) List out the h , k , l values for the first ten reflections of a solid crystallizing in a body centered cubic structure.

[P.T.O.]

Part II

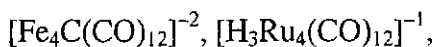
- A (06) Describe a method by which the surface acidity and cation exchange capacity of a naturally occurring clay sample can be estimated.
- B (07) With the help of a suitable example, discuss how the radius ratio of the ions involved can be useful in predicting the structure of a solid. How do you estimate the average crystallite size of a solid sample from its powder X-ray diffraction patterns?

Part III

- A (06) With the help of an appropriate diagram discuss the structural differences between the Amphibole and Pyroxene minerals.
- B (07) Discuss the reason behind the shape and size selectivity of zeolite catalysts. Is ZSM 5 a better Catalyst for fluid cracking? Justify your answer.

Part IV

- A (06) Predict the structure and geometry of any 03 of the following.



- B (06) The lattice parameters of a primitive cubic zeolite is 4.200 \AA , calculate the 2θ positions and d values of the 301, 400 and the 111 reflections determined by copper radiation ($\lambda = 1.5405 \text{ \AA}$).