M.Sc. 2nd Semester Examination, 2021

CHEMISTRY

(Inorganic Chemistry)

Paper : CHEM 201C

Course ID: 21451

Time: 2 Hours **Full Marks: 40**

The figures in the right hand side margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

1. Answer *any five* of the following questions: 2×5=10

   (a) What are the differences between Zeolite and bentonite clay?

   (b) Write down the molecular formula of Talc and Mica.

   (c) How many B-H-B and B-B-B bond are present in $B_{10}H_{14}$ cluster?

   (d) What are carborances? Explain with suitable example.

   (e) The aqueous solution of $[Ce(NO_3)_4(OPPh_3)_2]$ is yellow orange in colour- explain.

   (f) What is Fullers earth? Give one of its application.

   (g) Electronic spectra of lanthanide complexes appears same on changing the ligands- Explain

2. Answer *any four* of the following questions: 5×4=20

   (a) Define STYX number. How would you use the Lipscomb's model to find out the STYX code for B_5H_9 and B_6H_{10} cluster system? 1+2+2=5

   (b) Write down the general formula of Zeolites. Give any two uses of zeolites. 1+4=5

   (c) (i) Draw the structure of soro- and meta-silicate.

   (ii) Write down the characteristic fetchers of clays. 3+2=5

   (d) What are phosphazenes? Mention its uses for the conversion of aldehyde to alcohol with an example. 2+3=5

   (e)(i) Pr^{3+} and Nd^{3+} contains 2 and 3 unpaired electron respectively but μ_{exp} value for both the case are same. Whereas magnetic moments for d^n ions increases with increasing the number of electron. – Comment on it. 3+2=5

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(f) What is perovskite? Explain its structure. 2+3=5

3. Answer *any one* of the following questions: 10×1=10

(a) (i) "La^{3+} is diamagnetic but Eu^{3+} is not" – Explain.

(ii) Mention the primary and secondary building unit of Zeolites.

(iii) How lanthanides can be separated by ion exchange method?

(iv) Organolanthanide chemistry is not as extensive as organotransition metal chemistry. - Explain. 2+3+3+2=10

(b) (i) Mention the differences between tetrahedral hole and octahedral hole.

(ii) What are the Wade's rules? How can we use these rules to predict the structure of $B_5H_5^{4-}$ and P_4 clusters?

(iii) Which of the following clusters having arachno type structure? Explain.

(A) $Os_5(CO)_{16}$, (B) $Os_3(CO)_{12}$, (C) $Ir_4(CO)_{12}$, (D) $Rh_6(CO)_{16}$ 2+(2+4)+2=10