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1783/M

M-35/2051

ADVANCED TOPICS IN INORGANIC CHEMISTRY

Paper–412

Semester–IV

Time allowed : 3 Hours] [Maximum Marks : 55

Note : The candidates are required to two questions each from sections A carrying 8 marks and B carrying 8½ marks each. Section C consisting of 11 short answer type questions carrying 2 marks each.

SECTION-A

1. Describe the synthesis, types and purification of Carbon Nanotubes. 8

2. Define Self Assembled Monolayers and describe the structure and preparation of SAMs. 8

3. (a) Explain Bohr's Theory of nuclear reaction. 4

   (b) Illustrate the health and safety aspects in radiation protection. 4

4. (a) Explain briefly partial reactions and total cross reactions. 4

   (b) Explain with the help of the equation how is radioactive decay and growth measured. 4

SECTION-B

5. (a) What is a Metal Cluster. Discuss the isoelectronic and isolobal relationship. 4

   (b) Discuss the structural pattern and synthetic methods of metal carbonyl cluster of $M_4(CO)_{12}$ type (M = Co, Ir). 4½

6. Give a brief account of the octahedral metal halide clusters of M_6, X_8 type. 8½

7. Discuss the preparation, structure ami bonding in transition metal compounds doubly bonded to carbon. 8½

8. Discuss preparation, properties and structures of alkyl and aryl sulphanes. 8½

SECTION-C

9. (i) What is Ziegler-Natta catalyst and how it works.

(ii) Write about the types of nuclear reactions.

(iii) What are affinity biosensors?

(iv) What is sputtering of nano crystalline powders?

(v) Define beta decay.

(vi) How are $Fe(CO)_5$ and CH_4 related to each other.

(vii) What is the significance of glass transition temperature?

(viii) Distinguish between oligomerization and polymerization reactions.

(ix) How many number of M-M bonds are present in $Re_2X_8^{2}$.

(x) Distinguish between Fisher and Shrock Carbene.

(xi) State and explain intramolecular reductive elimination.

$11 \times 2 = 22$