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S. No. of Question Paper : 7687

Unique Paper Code : 32177901

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Name of the Paper : Novel Inorganic Solids

Name of the Course : B.Sc. (Hons.)/B.Sc. (Prog.) : DSE-2/2A

Semester : V

Duration : 3 Hours

Maximum Marks : 75

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

Attempt any five questions.

All questions carry equal marks.

- (a) Compare the chemistry of alkali metal compounds of graphite and fullerides.

(b) Explain the difference between the top-down and bottom-up methods of fabrication of materials. Give one example each.

(c) What do you mean by Surface Plasmon Resonance (SPR) ? Explain taking example of Gold nanoparticles. 5,5,5

P.T.O.

2. (a) What is condensate ? How DNA condensation is carried out in-vitro ?
- (b) What are the limitations of solid-state reactions ? What measures can be taken to overcome these ?
- (c) What are the steps involved in the preparation of SiO_2 by sol-gel method ?
3. (a) Distinguish between static and dynamic self-assembly. Give an example of each type.
- (b) Define biomimetics. Describe biomimetics with respect to how artificial fossilization is used to create titania paper.
- (c) What are silver Nanoparticles ? Explain any *one* method of its synthesis.
4. (a) Describe framework electrolytes. Choose framework electrolytes from the following :
 β -alumina, $\text{Rb}_4\text{Ag}_4\text{I}_5$, β'' -alumina, NASICON, Li_4GeO_4 , PbF_2 .
- (b) Discuss construction and working of Solid oxide fuel cell (SOFCs) in detail.
- (c) Explain why Egyptian blue, $\text{CaCuSi}_4\text{O}_{10}$ is pale blue and the spinel CuAl_2O_4 is an intense blue-green colour.

5. (a) Discuss the advantages and disadvantages of use of ion exchange resins.
- (b) What is the difference between SWNT and MWNT ?
What is the role of metal catalyst in the formation of SWNT ?
- (c) What are conducting polymers ? Write down one method of synthesis of any polymer. What are the various applications of conducting polymers ? 5,5,5
6. (a) Discuss the effect of environment on various composite materials.
- (b) What are the electrical, mechanical and other applications of ceramics ?
- (c) Fill in the blanks :
- (i) Quasi-particle used in condensed matter physics to understand the interactions between electrons and atoms in a solid are
- (ii) The materials which are considered as synthetic metals of twenty first century
- (iii) Zirconia is an example of refractories.

(iv) Alumina, silica and are the most important material in manufacturing of refractories.

(v) is the first one-dimensional metal complex. 5,5,5

7. Write short notes on any *three* of the following : 5,5,5

- (a) Bio-composites
- (b) Inorganic phosphors
- (c) Molecular magnets
- (d) NASICON.

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