Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

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M.Sc (Chemistry) Campus (2015 to 2017) (Sem.-4)

FUNCTIONAL MATERIALS

Subject Code : CHL-512A

M.Code : 74898

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. What interactions are important for designing host for

   a) soft metal ions

   b) NH_4^+ ions

2. How 2D-graphene based materials differ from graphene based materials in performance?

3. What are the advantages of supramolecular nanoassemblies over small molecules?

4. Define quaternary polymers by taking suitable example.

5. "*Smart materials are functional*"? Justify the statement.

6. Outline the difficulties in designing efficient supercapacitors.

7. Discuss one post polycondensation technique in detail.

8. "*Cooperativity is more important than proximity to achieve stable assembled architecture*"? Do you agree with the statement? Discuss.

9. Discuss the applications of discotic liquid crystalline dimmers.

10. What do you understand by metal loading?

SECTION-B

11. By taking at least two examples explain metal organic framework, explain relationship between structure and applications.

12. Explain by taking two examples, design parameters of biomolecule receptors. What are the other features needed for development of nanoarchitectures?

13. Discuss in detail properties and applications of Chitosan based materials.

14. Discuss with example synthesis of biopolymers by polycondensation. What are antimicrobial peptide mimics?

15. How crystal engineering is helpful in development of functional materials?

16. Discuss dye sensitized solar cells with examples.

SECTION-C

17. a) What are the advantages of hybrid materials? 3

    b) What are the difficulties associated with preparation of anionic receptors? 3

    c) How supramolecular chemistry is helpful in development of self-assembled monolayers? 4

18. a) Discuss different approaches to improve electrochemical performance of graphene based materials. 4

    b) Discuss with examples the effect of doping with heteroatom on performance of the graphene based materials? 6

19. a) What are organo metal halide perovskite cells? How they differ from conventional energy materials? 4

    b) Why are the characteristics of hydrogen storage materials and why we need them? 6

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.