Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **16CH3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MOLECULAR AND MATERIALS SELF ASSEMBLY** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 X 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List out the driving forces for molecular and materials self-assembly. | CO1 | 5 |
| b. | Mention the five principles that need to be taken into consideration for preparing self-assembled structures. | CO2 | 5 |
| c. | Look at the picture shown below. This structure prepared by the Nature is tough to be designed in the laboratory.   1. Comment on the limitations of technology in the design. 2. Explain briefly the possibilities of preparing such structures on the nanoscale currently and what you envisage in the future. 3. What can be the choice of materials? 4. What is the significance of such strcutures on the nanoscale? | CO2 | 5 |
| d. | Briefly explain soft lithography. | CO2 | 5 |
| **(OR)** | | | | |
| 2. |  | Explain the concept of self-assembled monolayers. How are they prepared? What are their applications? | CO2 | 20 |
|  | | | | |
| 3. | a. | Descibe the layer-by-layer assembly of metallopolymers. | CO3 | 10 |
| b. | How are polyelectrolyte colloid multilayers prepared? What are their applications? | CO3 | 10 |
| **(OR)** | | | | |
| 4. | a. | Give an account of LbL MEMS. | CO3 | 10 |
| b. | How are crystals engineered using oriented zeolite films? | CO3 | 10 |
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| 5. |  | Explain the following:   1. Modulated diameter gold nanorods. 2. Self-assembling nanorods of gold using DNA. | CO4 | 20 |
| **(OR)** | | | | |
| 6. | a. | How do magnetic nanorods bunch up as self-assembled structures? | CO4 | 15 |
| b. | Write in brief the methods of studying magnetic nanorods with instrumental techniques. | CO4 | 5 |
|  | | | | |
| 7. | a. | When is a nanocluster a nanocrystal or a nanoparticle? | CO4 | 5 |
| b. | Describe electrons and holes in nanocluster boxes. | CO5 | 15 |
| **(OR)** | | | | |
| 8. | a. | Explain the synthesis of capped semiconductor nanoclusters. | CO4 | 10 |
| b. | Give an account of water soluble nanoclusters. | CO4 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Give an account of nanostructures ceramics. | CO5 | 10 |
| b. | How can block copolymer thin films be assembled? Suggest methods for it. | CO5 | 10 |