[83] **Seat No :**_____

No. of Printed pages: 3

SARDAR PATEL UNIVERSITY
M.Sc. (SEMESTER-III) EXAMINATION
MONDAY, 25th NOVEMBER, 2019
TIME: 2.00 P.M. to 5.00 P.M.
CHEMISTRY (PS03EINC22)
(SELECTED TOPICS IN ADVANCED INORGANIC CHEMISTRY)

Note: Numbers to the right indicate full marks. **Total Marks: 70**

Q.1. Attempt the followings: [8]

1. Which is the correct statement for catalyst from the following?
   A) Catalyst is changed during catalysis
   B) Catalyst does not affect the rate of reaction
   C) Catalyst does not affect the state of equilibrium of reaction
   D) Catalyst affects the state of equilibrium of reaction
2. Which of the following stabilizers is largely vanished in the last years due to health and environmental concerns?
   A) Cadmium based B) Calcium-Zinc based
   C) Tin based D) Organo-Calcium based
3. Cr–MIL-100 (MIL=Materiaux d'Institute Lavoisier) is based on two well defined building units
   A) chromium metal and trimesate moiety
   B) trimeric chromium cluster and trimesate moiety
   C) trimeric chromium cluster and trimesic acid moiety
   D) chromium metal and trimesic acid moiety
4. The concept of modifying the pores within an extended network was first suggested by _____ in _____.
   A) Lee, Kim and Williams, 1999 B) Wang and Cohen, 2007
   C) Hoskins and Robson, 1990 D) None of these
5. Polyoxometalates are _____.
   A) Always positively charged B) Sometimes positively charged
   C) Always negatively charged D) Sometimes negatively charged
6. Polyoxometalates generally have _____ unit.
   A) MO_6 B) MO_5
   C) MO_4 D) MO_7
7. It's easier for atoms and molecules to move around and between one another and due to this _____ properties of Nanomaterials can be different.
   A) Mechanical properties B) Physical properties
   C) Optical properties D) Chemical properties

(P.T.O.)

8. Computer chips are the example of _____ nanomaterials.
   A) Three dimension B) Zero dimension
   C) Two dimension D) One dimention

Q.2. Attempt any SEVEN of the followings: [14]

1. What is homogeneous catalysis? Explain with suitable examples.
2. List out the differences between homogeneous and heterogeneous catalysis.
3. Write a short note on ZSM-5.
4. What are the structural features of MOFs? Give explanation for all of them.
5. What is the importance of pore size in Metal Organic Frameworks?
6. What are Polyoxometalates? Explain their properties and types.
7. Explain the strategy for the synthesis of Polyoxometalates.
8. How band gap is affected when you go down from bulk materials to nanomaterials?
9. Explain the process for the synthesis of aerogels.

Q.3.A. Explain phase transfer catalysis and intermolecular catalysis. [6]

B. Describe catalyst poisoning and poisoning process. Also list out the common catalyst poisons. [6]

OR

B. Answer the following:

1. What are the advantages and drawbacks of conventional acid catalyzed processes and solid acid catalysts? [3]
2. How to prepare SO_4^{-2}/ZrO_2? [3]

Q.4.A. How MOFs are characterized after synthesis? Give detailed explanation for each characterization technique. [6]

B. Write a note on high through put method for the synthesis of Metal Organic Frameworks. List out advantages and disadvantages of the method. [6]

OR

B. Answer the following:

1. Describe four types of precursor approaches used in MOFs. [3]
2. Write a note on "Investigation of MOFs Porosity and Protocol for Sample Activation". [3]

Q.5.A. Write a note on basic structural units in POMs. Discuss corner and edge sharing in POMs. [6]

(2)

B. Explain different types of POMs in detail. [6]

OR

B. **Answer the following:**

1. Describe the synthesis of MW_5 hexametalates. [3]
2. Explain the possible mechanism for the formation of blackberry type POMs. [3]

Q.6.A. Give classification of nanomaterials in detail with suitable examples. [6]

B. **Answer the following:**

1. Explain the synthesis of nanomaterials. [3]
2. Describe carbon nanowires. [3]

OR

B. Write a note on medicinal properties of nanomaterials. [6]

— X —

(3)