SEAT No._____ No. of Printed pages: 02

SARDAR PATEL UNIVERSITY

[71] **M. Sc. (Industrial Chemistry), Fourth (4th) Semester Examination**

April - 2018

PS04EICH06—Advanced Analytical Chemistry

Thursday, 19th April, 2018

Time: 02:00 p.m. to 05:00 p.m. **Total Marks: 70**

Note: i) Attempt all the questions.
ii) Figures to right indicate full marks.
iii) Draw neat diagrams wherever it requires.

Q-1 **Answer the following Multiple Choice Questions.** **Marks (08)**

1. In a molecule with a centre of symmetry, it is seen that vibrations that are Raman active are IR inactive & vice – versa. This principle is called _____.

   a) mutual explosion c) mutual expanse
   b) mutual exclusion d) rocking exclusion

2. In the *Stokes process*, which is the parallel of absorption, the scattered photons are shifted to _____ frequencies.

   a) lower c) medium
   b) higher d) rocking exclusion

3. In particle size analysis, NIBS means ____.

   a) Non – Ionic Back Scatter c) Normal-Isolated Back Scatter
   b) Non – Invasive Back Scatter d) New-Ionic Back Scatter

4. _____ spherical particles will typically flow more easily than smaller or high aspect ratio particles.

   a) Larger, more c) Larger, less
   b) Larger, high aspect ratio d) Larger, heavy

5. The first step is _____ in ICP which is the removal of the solvent from the droplets, resulting in microscopic solid particulates, or a dry aerosol.

   a) drying c) desolvation
   b) dissolution d) dispensing

6. _____ is a powerful tool for the determination of metals in a variety of different sample matrices.

   a) Flame photometry c) OES
   b) HPLC d) GC

7. TEM images are formed using _____ electrons.

   a) reflected c) transmitted
   b) power d) soft

8. The TEM sample should be thin, due to the _____ of the electron in the material

   a) scattering c) adsorption
   b) none of these d) absorption

(P.T.O.)

Q-2 Answer the following short questions. Each question carries equal mark.(**Any Seven**) **(14)**

1. What is scattering geometry of Raman Spectroscopy?
2. What is the principle of Raman Spectroscopy?
3. What is the importance of particle size analysis?
4. Define Hydrodynamic diameter.
5. Which types of ions are generated in ICP?
6. What are the various disadvantages of ICP?
7. What is the major use of ICP/OES technique?
8. Give working principle of TEM.
9. What are the limitations of TEM?

Q-3 (a) Write the difference between Raman Spectroscopy & IR. **(06)**

Q-3 (b) What is Raman spectroscopy? Explain Rayleigh scattering, Raman scattering, & IR absorption. **(06)**

OR

Q-3 (b) Discuss Rayleigh, Stocks & Anti- stocks scattering with respect to the energy associated with these. **(06)**

Q-4 (a) Write a note on zeta potential in PSA. **(06)**

Q-4 (b) Write a note on equivalent sphere concept in PSA. **(06)**

OR

Q-4 (b) Discuss wet & dry dispersion techniques in PSA technique. **(06)**

Q-5 (a) Write a brief note on axial, radial and dual view of torch configuration in ICP. **(06)**

Q-5 (b) Discuss generation of ICP. **(06)**

OR

Q-5 (b) Write a note on electrothermal vaporization in ICP technique. **(06)**

Q-6 (a) Differentiate between SEM & TEM. **(06)**

Q-6 (b) Explain the effects of electron interaction with the sample in TEM. **(06)**

OR

Q-6 (b) 1) Write a note on chemical analysis by EDS in TEM. **(03)**

2) What is electrolytic polishing in TEM? **(03)**

----------x----------