[A-21] **SARDAR PATEL UNIVERSITY** **No.of Printed pages:2**

M.Sc. (SEMESTER-IV) EXAMINATION

2015

Saturday, 25th April

10.30 a.m. to 01.30 p.m.

INORGANIC CHEMISTRY: PS04CINC03

(INORGANIC POLYMERS AND INORGANIC SPECTROSCOPY)

TOTAL MARKS: 70

Note: Numbers at the right show full marks.

Q.1.(A) Attempt the following: **8**

1 Heteroatomic polymers having frame work of elements of group _____ are most interesting.
(a) 13 & 15 (b) 3 & 5 (c) 13 (d) all of these

2 Sulfur bridges introduce_____ in inorganic polymers.
(a) polarity (b) stiffness (c) flexibility (d) hydrophobicity

3 How many types of Fluorine atoms are present in the structure of $[SbF_5]_n$?
(a) 1 (b) 2 (c) 3 (d) 5

4 A metal coordination polymer must contains _____ in its repeating unit.
(a) metal complex (b) metal (c) transition metal (d) metal salt

5 In an esr instrument the resonant cavity is placed_____ the poles of an electromagnet.
(a) inside (b) above (c) between (d) below

6 Solvents with high dielectric constant _____ microwaves.
(a) amplify (b) absorb (c) transmit (d) destroy

7 Two lines instead of single line are observed in Mossbauer spectra due to_____effect.
(a) Mossbauer (b) Doppler (c) magnetic (d) quadrupole

8 The frequency of gamma rays is varied in Mossbauer spectrometer by_____ effect.
(a) Mossbauer (b) Doppler (c) magnetic (d) quadrupole

Q.2. Attempt any SEVEN of the following: **14**

1 Explain the term: solubility parameter.
2 Calculate the number of skeletal bonding electron pairs for nido-1,2-$C_2B_3H_7$.
3 Describe the reactions involved in Rochow-Muller process.
4 What are parquet polymers?
5 Giving suitable example, explain cofacial phthalocyanine polymers.
6 Predict the esr spectrum of $[Cu(acac)_2]$.
7 Calculate the esr frequency of an unpaired electron in a magnetic field of 3000 G.
[g=2, $\beta=11.274 \times 10^{-24}$ J/T and h= 6.626×10^{-34} Js]
8 Explain the principle of Mossbauer spectroscopy.
9 State the applications of Mossbauer spectroscopy.

2...

Q.3.(A) Give an account of applications of different types of silicone polymers. **6**

Q.3.(B) **Attempt the following:**

1 Discuss the interconversions of polyphosphate salts. **3**

2 Write a note on preparation and structure of tetrasulfur tetranitride. **3**

OR

Q.3.(B) Give preparations, properties and isomeric structures of large closo-carborane.

Q.4.(A) Outline the general methods of preparation of coordination polymers. **6**

Q.4.(B) **Attempt the following:**

1 Give the applications of synthetic coordination polymers. **3**

2 Explain the structure of polymeric $[SbF_5]_n$. **3**

OR

Q.4.(B) Write a full note on natural coordination polymers.

Q.5.(A) Describe the instrumentation of an esr spectrometer. **6**

Q.5.(B) **Attempt the following:**

1 Explain the use of DPPH as a standard in esr spectroscopy. **3**

2 List the types of information available from esr spectra. **3**

OR

Q.5.(B) Discuss the hyperfine structure and esr spectra of methyl radical and p-benzosemiquinone radical anion.

Q.6.(A) Explain the chemical shift and quadrupole splitting observed in Mossbauer spectra. **6**

Q.6.(B) **Attempt the following:**

1 What is recoilless emission? Under which conditions Mossbauer effect can be observed? **3**

2 List essential characteristics expected from a Mossbauer nuclide. **3**

OR

Q.6.(B) Using Mossbauer spectroscopy, establish the structure of $Fe_3(CO)_{12}$.