SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. END SEMESTER EXAMINATION APRIL/NOV - 2021
SEMESTER - III
20PCHCT3008 - Inorganic Chemistry - III

Total Duration : 3 Hrs		**Total Marks : 75**	
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. How does combination of IR and Raman spectroscopic analysis reveal the structure of NO_3^- as planar and ClO_3^- as pyramidal?
2. a) How are terminal and bridging carbonyl groups differentiated using IR spectroscopy.
   b) Though same source of radiation is used both in Raman and IR spectra, same solvent is not be used. Give reasons
3. Derive the ground term symbol of d^3 and d^5 metal ions
4. The electronic spectrum of $[V(H_2O)_6]^{3+}$ exhibited bands at 17400, 25200, and 34500 cm^{-1}. Calculate 10Dq and Racah parameter.
5. a) Indicate the principle of NQR spectroscopy and predict the resonance lines expected in the following nuclei: As^{75}(I= 3/2) , $\eta = 0$ and Ho = 0
   b) Specify the conditions for an isotope to be NQR active and give any two examples.
6. Explain the principle of PES (photoelectron spectroscopy) in calculating the binding energy of electron.
7. Compute the number of EPR spectral lines expected for $[Cu(H_2O)_6]^{2+}$ and $[Ti(H_2O)_4(NH_3)_2]^{2+}$.
8. Describe the principle and applications of chemical shift reagents in magnetic resonance imaging.

Section C

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Explain in detail the electronic transitions of d^{1-10} metal ions in octahedral and tetrahedral geometry using Orgel diagram.
10. Illustrate the application of Mossbauer spectroscopy in differentiating $K_4[Fe(CN)_6]$ and $K_3[Fe(CN)_6]$ complexes.

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11. How is unit cell identified from diffraction pattern?
12. Describe the principle and application of X ray fluorescence spectroscopy in the structural elucidation of chemical compounds.

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. Describe the types of Jahn-Teller distortion in d^{1-10} configurations of low spin and high spin octahedral complexes and the influence of this effect on the UV electronic spectrum.