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DII-003-010403 Seat No. _____

M. Sc. (Sem. IV) Examination

May / June – 2015

Inorganic Chemistry

C(I) - 403 : Bonding in Complexes

Faculty Code : 003
Subject Code : 010403

Time : Hours] [Total Marks :

Instructions: (1) All Questions are compulsory
(2) All Questions carry equal Marks

Q.1 Answer the following (Any Seven) [14]

a. Define spin orbit coupling

b. Explain Racah Parameters

c. Draw shape of all the d – orbital on the basis of CFT

d. Determine S,M_L,L.M_L.and J in d^3 configuration

e. Write note on laporte selection rules

f. Brief the use of Tanabe – Sugano diagram

g. Explain the splitting of d-orbital in octahedral symmetry

h. Find out the spectral term for the Co^{++} and Ni^{++} ions

i. Show that $P_{(l)}$ Cos θ = Cos θ , where l=1

j. Explain R-S-coupling

Q.2 Answer the following (Any Two) [14]

a. Explain charge transfer spectra

b. Construct the correlation diagram d^2 configuration

c. Write note on Jahn-Teller effect

Q.3 Answer the following (Any Two) [14]

a. Show that $< m/x^4+y^4+z^4/m' > = 13/21\ r^4$, when $m = m' \pm 2$

b. Discuss the Electronic spectra of d^1 to d^9 (d^3 & d^7)

c. Calculate energy of the integral $< \phi_2\phi_0 \mid Voct \mid \phi_2\phi_0 >$,
where $< \phi_0 \mid Voct \mid \phi_0 > = 6Dq$ and $< \phi_2 \mid Voct \mid \phi_2 > = Dq$

Q.4 Answer the following [14]

a. Show that $P_l \cos\theta = 1/8(35\cos^4\theta - 30\cos^2\theta + 3)$, where $l = 4$
b. Derive all the possible Microstates for d^2-configuration

Q.5 Derive the formula $Voct = 6Ze^2/a+(X^4+Y^4+Z^4-3/5r^4)$ in octahedral field

Or

Q.5 Answer the following (Any Two) [14]

a. Explain Nephelouxetic effect
b. Show that $< m/x^4+y^4+z^4/m' > = 11/21\ r^4$ when $m = m' \pm 1$