



DBJ-003-2015005

Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

June - 2022

Chemistry : C-501

(Inorganic & Industrial Chemistry) (New Course)

Faculty Code : 003

Subject Code : 2015005

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) Answer any five questions out of ten.
(2) All questions carry equal marks 14 each.
(3) Right side figures are marks of each question.

- 1 (a) Answer the following questions : 4
(1) Define – Multielectron system.
(2) What is Term Symbol ?
(3) Define – Microstate.
(4) Give the representation of spectral term.
- (b) Answer the question : 2
Explain s-s coupling.
- (c) Answer the question : 3
Explain L-S coupling.
- (d) Answer the question : 5
Calculate the Microstates for d^2 case.
- 2 (a) Answer the following questions : 4
(1) What is spin multiplicity ?
(2) Define – Spectral term
(3) Give the formula to calculate Microstate.
(4) Give the spectral term for p^2 case.
- (b) Answer the question : 2
Draw the Orgel diagrams of D and F state.
- (c) Answer the question : 3
Write short note – Hund's rule to determine ground state spectral term.

- (d) Answer the question : 5
 What is Hole formalism ? Explain spherical charge symmetry and charge asymmetry of d orbitals.
- 3 (a) Answer the following questions : 4
 (1) Who introduced Crystal Field Theory ?
 (2) Which orbitals are not much affected by ligands ?
 (3) Which type of attraction force is found between metal and ligand ?
 (4) “In Octahedral complexes, energy of t_{2g} orbital decreases”. True or False.
- (b) Answer the question : 2
 Explain high spin and low spin complexes.
- (c) Answer the question : 3
 Explain the splitting of d orbitals in tetrahedral field.
- (d) Answer the question : 5
 Discuss the Jahn Teller effect in detail
- 4 (a) Answer the following questions : 4
 (1) Who explained the magnetic properties of complexes using Crystal Field Theory ?
 (2) What is symbol P in Crystal Field Theory ?
 (3) What is Crystal Field Splitting ?
 (4) Which orbitals show decrease in energy in tetrahedral field ?
- (b) Answer the question : 2
 “Magnetic momentum value is found more practically in Ni^{2+} compounds than calculated value”. Justify.
- (c) Answer the question : 3
 Explain the splitting of d orbitals in square-planar complexes.
- (d) Answer the question : 5
 Discuss the factors affecting splitting energy.
- 5 (a) Answer the following questions : 4
 (1) ϵ is symbol for Extinction coefficient – True / False.
 (2) Give the wavelength range, useful for transition metal absorption spectrum.
 (3) Which theories are useful to study the absorption spectrum of transition metal complexes.
 (4) Which transition occurs in transition metal ion ?

- (b) Answer the question : 2
Explain $\pi \rightarrow \pi^*$ charge transfer transition.
- (c) Answer the question : 3
Give the La Porte selection rules for transition metal absorption spectrum.
- (d) Answer the question : 5
Discuss the absorption spectrum of Ti^{3+} .
- 6 (a) Answer the following questions : 4
(1) Define – Glass.
(2) What is cullet ?
(3) In which type of glass silver halide is used ?
(4) Why lead glass is used in optical work ?
- (b) Answer the question : 2
Give the colouring agents useful in glass manufacturing.
- (c) Answer the question : 3
Write the chemical properties of glass.
- (d) Answer the question : 5
Discuss the new materials used in glass manufacturing.
- 7 (a) Answer the following questions : 4
(1) What is fertilizer ?
(2) Give the secondary elements useful for plant growth.
(3) What is mixed fertilizers ?
(4) Give the role of Boron as micro nutrient for plant growth.
- (b) Answer the question : 2
Explain the role of phosphorus in plant.
- (c) Answer the question : 3
Write on manufacturing of ammonium nitrate by Prill method.
- (d) Answer the question : 5
Discuss the classification of fertilizers.
- 8 (a) Answer the following questions : 4
(1) What is Filer ?
(2) Give the major elements useful for plant growth.
(3) Give the examples of potassium fertilizers.
(4) What is formula of Ammonium Carbamate ?
- (b) Answer the question : 2
Explain – Action of urea as fertilizer.

- (c) Answer the question : 3
 Explain the manufacturing of monoammonium phosphate.
- (d) Answer the question : 5
 Give the comparison of Natural and Synthetic fertilizer.
- 9** (a) Answer the following questions : 4
 (1) What is cement ?
 (2) Which pigment is used for Red Colored Cement ?
 (3) Give the formula of C_3A
 (4) What is sulphate resistant cement ?
- (b) Answer the question : 2
 Give the advantages of RCC over plain concrete.
- (c) Answer the question : 3
 Give the raw material used in cement manufacturing.
- (d) Answer the question : 5
 Discuss the properties of cements.
- 10** (a) Answer the following questions : 4
 (1) Give the full form of RCC.
 (2) What is the formula of C_3S ?
 (3) Which pigment is used for green cement ?
 (4) Define – Slag cement.
- (b) Answer the question : 2
 Explain ISI specification of cement.
- (c) Answer the question : 3
 Explain the setting of cement.
- (d) Answer the question : 5
 Discuss the manufacturing of cement by wet process.
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