



JV-003-1015005 Seat No. _____

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

September / October - 2019

Chemistry : C-501

(Inorganic & Industrial Chemistry)

Faculty Code : 003
Subject Code : 1015005

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

[Total Marks : 70

Instructions :

- (1) All the questions are compulsory.
- (2) All the question carry 14 marks.

- 1 (a) Answer the following questions : 4
- (1) Define operator.
 - (2) What is Zero point energy ?
 - (3) “ θ equation is useful to know about magnetic quantum number.” True or False.
 - (4) Write the normalized wave equation for particle moving in one dimensional box.
- (b) Answer any one in brief : 2
- (1) Explain multiplication of operator.
 - (2) Normalize the wave equation : $\Psi = N \cdot e^{-r/a_0}$.
- (c) Answer any one in detail : 3
- (1) Explain Hamiltonian operator.
 - (2) Find out the degeneracy of a particle moving in cubic box of length a at the energy level $E = \frac{ah^2}{8ma^2}$.
- (d) Write notes : (any one) 5
- (1) Discuss in detail particle moving in one dimensional box.
 - (2) Give the Schrodinger equation in polar coordinates and derive R, θ, ϕ variable separation.

- 2 (a) Answer the following questions : 4
- (1) Who explained the magnetic properties of complexes using Crystal Field Theory ?
 - (2) Define pairing energy.
 - (3) $[\text{NiCl}_4]^{2-}$ is paramagnetic – True or False.
 - (4) Which orbitals are not much affected by ligands ?
- (b) Answer any one in brief : 2
- (1) Explain high spin and low spin complexes.
 - (2) Give the conditions for orbital rotation of electron.
- (c) Answer any one in detail : 3
- (1) Write short note – Splitting of d orbitals in tetrahedral field.
 - (2) Explain the orbital contribution to magnetic momentum in various crystal fields.
- (d) Write notes on : (any one) 5
- (1) Discuss the factors affecting splitting energy.
 - (2) Discuss the features of Crystal Field Theory.
- 3 (a) Answer the following questions : 4
- (1) Define π -acid ligands.
 - (2) Draw the structure of $\text{Fe}_3(\text{CO})_{12}$.
 - (3) Give the name of principal constituents of cement.
 - (4) Give the full form of RCC.
- (b) Answer any one in brief. 2
- (1) Explain the classification of metal-carbonyls.
 - (2) Explain setting and hardening of cement.
- (c) Answer any one in detail : 3
- (1) Write short note – Metal nitrosyls.
 - (2) Write short note – Rock beneficiation.
- (d) Write notes on : (any one) 5
- (1) Discuss the application of I.R. spectroscopy in the study of metal carbonyls.
 - (2) Discuss the properties of cement.

- 4 (a) Answer the following : 4
- (1) What is micronutrient ?
 - (2) Give the role of Boron in fertilizer.
 - (3) Give the factors affecting the soil fertility.
 - (4) Give the formula of Chile saltpeter.
- (b) Answer any one in brief : 2
- (1) Write about essential requirements of fertilizer.
 - (2) Give about the nomenclature of fertilizer.
- (c) Answer any one in detail : 3
- (1) Explain the action of urea as fertilizer.
 - (2) Explain the classification of fertilizer.
- (d) Write the notes on : (any one) 5
- (1) Discuss the prilling method to manufacture Ammonium nitrate.
 - (2) Describe the Den process for manufacturing of normal super phosphate.
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- 5 (a) Answer the followings : 4
- (1) Define glass.
 - (2) What is cullete ?
 - (3) What is Annealing ?
 - (4) Name the chief ingredient of glass.
- (b) Answer any one in brief : 2
- (1) Write the properties of glass.
 - (2) What is optical glass ?
- (c) Answer any one in detail : 3
- (1) Write the chemical reactions involved in glass making.
 - (2) Write about colouring agents for glass.
- (d) Write the notes on : (any one) 5
- (1) Discuss the raw materials used in glass manufacturing.
 - (2) Discuss the glass manufacturing using pot furnace.