JA-003-1016006   Seat No. _____

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

August - 2019

C-601 : Inorganic & Industrial Chemistry

Faculty Code : 003
Subject Code : 1016006

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions: (1)   This question paper contains five questions, each 14 marks. All are compulsory.

(2)   Figures to the right indicate full marks of subquestion.

(3)   Write answer of all questions in main answer sheet.

1   **(A)**   Answer the following questions :   **4**

(1)   What is the order energy of ^1D, ^1S and ^3P for p^2-case ?

(2)   Give formula for calculation of number of microstate.

(3)   What is the formula of spectral term ?

(4)   What are microstates ?

(B)   Answer any one :   **2**

(1)   Calculate ground state spectral term for p^3-system.

(2)   Calculate S, L and J value for ^1G.

(C)   Answer any one :   **3**

(1)   Explain l-l coupling for p^2-state with vector diagram.

(2)   Write Hund's rules for determination of ground states spectral term.

(D)   Answer any one :   **5**

(1)   Calculate allowed spectral terms for d^2-case using pegion hole diagram and arrange it in order of stability.

(2)   Calculate microstates for p2-system and arrange it spectral term in order of stability.

2 **[A]** Answer the following questions :   **4**

     (1) Write statement of Jahn-Teller theorem.

     (2) What is orbital allowed transition ?

     (3) Which three transitions are found in [Ti $(H_2O)_6]^{3+}$ absorption spectra ?

     (4) What is tetragonal distortion structure ?

   [B] Answer any one :   **2**

     (1) Draw the Orgel diagram for d^2, d^3, d^7 and d^8 case in Oh and Td field.

     (2) Explain Spin selection rules.

   [C] Answer any one :   **3**

     (1) Calculate Jahn-Teller stabilization energy for $Cu^{2+}(d^9$-case) Oh-field with diagram.

     (2) Explain spectral terms of d^1 and d^9 are same but their splitting is inverse.

   [D] Answer any one :   **5**

     (1) Discuss with diagram: Absorption spectra of $[Cu(H_2O)_6]^{2+}$.

     (2) Explain with diagram: Orgel Diagrams for D-state.

3 **[A]** Answer the following questions :   **4**

     (1) Define: Magnetic susceptibility.

     (2) Give example of Anti-ferromagnetic substance.

     (3) What is Rancidification ?

     (4) Complete the following reaction

$$NiSO_4 + 2\ HCOONa \xrightarrow{NH_4OH}$$

   [B] Answer any one :   **2**

     (1) Explain Neel and Curie temperature.

     (2) Explain with example: Saponification value.

   [C] Answer any one :   **3**

     (1) Explain characteristics of ferromagnetic substance.

     (2) Explain the method to determination acid value of oil with formula.

[D] Answer any one : 5

(1) Derive the equation for Diamagnetic moment.

(2) Explain with diagram: Dry process of Hydrogenation of oils.

4 [A] Answer the following questions : 4

(1) Which main component is present in stratosphere layer ?

(2) Give names of segments of environment.

(3) Give main organic components of photochemical smog.

(4) What is Ecosystem ?

[B] Answer any one : 2

(1) What is thermal pollution ?

(2) Write some major water pollutants.

[C] Answer any one : 3

(1) Explain the factors responsible to increase green house effect.

(2) How acid rain occurs ?

[D] Answer any one : 5

(1) Explain how in different ways the water is polluted ? Give some ideas to prevention of water pollution.

(2) What are BOD and COD? Explain determination of COD.

5 [A] Answer the following questions : 4

(1) Define with example: Soft soap

(2) Which substance is added for anti-dandruff agent ?

(3) Which coloring agent is used for blue and white colour soap?

(4) What is rosin?

[B] Answer any one :   **2**

    (1) What are binding agents in soap ?

    (2) Explain Neem soap.

[C] Answer any one :   **3**

    (1) Explain with example: Anti foaming agents and Binders in detergent.

    (2) Explain recovery of glycerin from spent lye.

[D] Answer any one :   **5**

    (1) What are anionic detergents? Explain Alfol process.

    (2) Explain manufacturing of soap by continuous process.