



Seat No. \_\_\_\_\_

**H-003-2016006**

**B. Sc. (Sem. VI) (CBCS) (W.E.F. 2019) Examination**

**April - 2023**

**C-601 : Chemistry**

*(Inorganic Chemistry & Industrial Chemistry) (New Course)*

**Faculty Code : 003**

**Subject Code : 2016006**

Time :  $2\frac{1}{2}$  Hours / Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) All questions carry 14 marks each.

- 1 (a) Answer the following : 4  
(1) Define subtraction of operators.  
(2) Give value of cartesian coordinates into polar coordinates.  
(3) What is the value of energy of 1s orbital ?  
(4) What does the straight line of energy spectra emphasize?
- (b) Answer any **one** : 2  
(1) What is commutator of operators ?  
(2) Prove that  $\psi = A \sin \alpha x$  is a solution of  
$$\frac{d^2\psi}{dx^2} + \alpha^2\psi = 0. \text{ Where } \alpha = \text{constant.}$$
- (c) Answer any **one** : 3  
(1) Calculate the zero point energy for a particle moving in a cubic box of dimensions  $0.2 \text{ \AA}$ . Where  $C = 3 \times 10^{10} \text{ cm sec}^{-1}$ ,  $h = 6.62 \times 10^{-27} \text{ erg sec}$ .  $m = 1.672 \times 10^{-24} \text{ gm}$ .  
(2) Normalize the wave function  $\psi = N e^{-r/a_0}$  where  
 $0 < r < \alpha, 0 < \phi < 2\pi, 0 < \theta < \pi, dT = r^2 \sin \theta dr d\theta d\phi$ .
- (d) Answer any **one** : 5  
(1) Discuss linear polyenes as one dimensional box model and explain calculation of C-C bond length.

- (2) Derive energy equation for a particle moving in three dimensional box and explain degeneracy.
- 2 (a) Answer the following : 4
- (1) Define unit pole.
  - (2) Define diamagnetism.
  - (3) Give equation of total magnetic moment  $\mu_{S+L}$ .
  - (4) Give equation of magnetic induction B.
- (b) Answer any **one** : 2
- (1) What is Neel temperature ?
  - (2) What is magnetic permeability ?
- (c) Answer any **one** : 3
- (1) Name the types of magnetism and define paramagnetism.
  - (2) List the characteristics of diamagnetic susceptibility.
- (d) Answer any **one** : 5
- (1) Explain diamagnetism and derive the equation of  $\chi_{M(di.)}$ .
  - (2) Explain Gouy's method for the determination of magnetic susceptibility.
- 3 (a) Answer the following : 4
- (1) Define  $\pi$ -acidity.
  - (2) Define metal nitrosyls.
  - (3) What is Rancidity ?
  - (4) Define drying oils.
- (b) Answer any **one** : 2
- (1) Define winterization.
  - (2) Give common physical properties of metal carbonyls.
- (c) Answer any **one** : 3
- (1) Give classification of metal carbonyls.
  - (2) Give chemical equation of hydrogenation of oil.
- (d) Answer any **one** : 5
- (1) Discuss the M-CO linearity with structural evidences.
  - (2) Describe the determination method of Acid Value and saponification value.

- 4 (a) Answer the following : 4
- (1) How much oxygen does a healthy man breath per day?
  - (2) Give atleast three sources of water pollution.
  - (3) Define BOD.
  - (4) What is mist?
- (b) Answer any **one** : 2
- (1) What is petrochemical smog? List its harmful effects.
  - (2) Give the chain reaction which occurs at stratosphere.
- (c) Answer any **one** : 3
- (1) Write a short note, "Harmful effects of  $\text{NO}_x$ ".
  - (2) Write a short note, "Toxic effect of strato and domestic waste water".
- (d) Answer any **one** : 5
- (1) Discuss about Green House Effect.
  - (2) Describe "The Acid Rain".
- 5 (a) Answer the following : 4
- (1) What is the role of resins in soap industry ?
  - (2) Which compounds are used as fillers in soap ?
  - (3) Give any three examples of glycerides used in soap.
  - (4) Name the methods used to manufacture soap.
- (b) Answer any **one** : 2
- (1) Give classification of surfactants.
  - (2) What is semipolar detergent ?
- (c) Answer any **one** : 3
- (1) Give comparison between soaps and detergents.
  - (2) What is zwiterionic detergent ?
- (d) Answer any **one** : 5
- (1) Explain the terms :
    - (1) Cationic detergents
    - (2) Anionic detergents
    - (3) Non ionic detergents.
  - (2) Explain the manufacture of soap by Hot process with basic principle.