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(May)

CHEMISTRY

(Major)

Course : 603

(Inorganic Chemistry—III)

*The figures in the margin indicate full marks
for the questions*

(New Course)

Full Marks : 48

Pass Marks : 14

Time : 2 hours

1. Choose the correct answer : 1×5=5

(a) Non-heme iron protein is

(i) hemoglobin

(ii) myoglobin

(iii) hemerythrin

(iv) cytochrome P-450

(b) The function of plastocyanin is

(i) oxidation of L-ascorbic acid

(ii) electron transfer in plants

(iii) oxidation of primary amine

(iv) oxygen transport

- (c) The formula of kaolinite clay is
- (i) $\text{Al}_2\text{O}_3 \cdot \text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$
 - (ii) $\text{Al}_2\text{O}_3 \cdot \text{Na}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$
 - (iii) $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
 - (iv) $\text{Al}(\text{OH})_3 \cdot \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- (d) Paper chromatography is more suited to
- (i) partition
 - (ii) molecular sieving
 - (iii) ion exchange
 - (iv) adsorption
- (e) In 1952, the 'Minamata' disease in Japan was caused by poisoning effect of
- (i) Pb
 - (ii) Cd
 - (iii) Hg
 - (iv) As

UNIT—I

2. (a) Answer any *three* questions : $4 \times 3 = 12$
- (i) Describe the role of copper in biological system. 4
 - (ii) What are the functions of hemoglobin and myoglobin? What are the principal similarities in their structures? 3+1=4
 - (iii) What is carboplatin? Give one of its uses. What are its advantages over those of *cis-platin*? 1+1+2=4

- (iv) Explain one function of each of the following metals in biological system : $2 \times 2 = 4$
- (1) Molybdenum
 - (2) Magnesium
- (b) Write a note on any *one* of the following : 2
- (i) Nitrogenase
 - (ii) Chelation therapy

UNIT—II

3. (a) Answer any *three* questions : $3 \times 3 = 9$
- (i) Discuss about the advantages of solid-state reaction with the help of two examples. 3
 - (ii) What are the supramolecular interactions? Give two examples. 3
 - (iii) Mention the two basic approaches for synthesis of nanomaterials. Name the two characterization techniques for nanomaterials. $1\frac{1}{2} + 1\frac{1}{2} = 3$
 - (iv) What are clay minerals? Give the formula and uses of montmorillonite clay. $1 + 2 = 3$
- (b) Mention two applications of nanomaterials. 2

UNIT—III

4. (a) Describe the principle and application of paper chromatography. 3

Or

Define the terms 'stationary phase' and 'mobile phase' in chromatographic process. Name the phases used in TLC.

2+1=3

- (b) Write a short note on any one of the following : 2
- (i) Principles of gas chromatography
 - (ii) Advantages of TLC over paper chromatography

UNIT—IV

5. (a) Answer any three questions : 3×3=9

(i) What do you mean by setting of cement? Write down the reactions involved in it. 1+2=3

(ii) What are paints? Mention the names of essential parts of a paint. What is the role of a binder? 1+1+1=3

(iii) What is demineralized water? Describe a method of demineralization of water. 1+2=3

(iv) Discuss the poisoning effect of mercury (Hg) on human body. 3

(b) Write short notes on any *two* of the following : 2×2=4

- (i) Glazing compounds of ceramics
- (ii) Role of thinner in paint industry
- (iii) Hazard from radioactive fallout
- (iv) Composition of cement

(Old Course)

Full Marks : 48

Pass Marks : 19

Time : 3 hours

1. Choose the correct answer : 1×5=5

(a) Which of the following enzymes do not have heme group?

- (i) Hemoglobin
- (ii) Ferredoxin
- (iii) Cytochrome oxidase
- (iv) Catalase

(b) Which vitamin is known as cyanocobalamin?

- (i) B₆
- (ii) B₁₂
- (iii) K
- (iv) C

- (c) Which technique is used for the characterization of nanomaterials?
- (i) SEM
 - (ii) AFM
 - (iii) XRD
 - (iv) All of the above
- (d) The stationary phase in adsorption chromatography is
- (i) liquid
 - (ii) solid
 - (iii) gas
 - (iv) colloid
- (e) Minamata disease is caused by poisoning of
- (i) Pb
 - (ii) Hg
 - (iii) Cd
 - (iv) As

UNIT—I

2. Answer any *three* questions : 2×3=6
- (a) What is plastocyanin? Mention its function in plant body. 1+1=2
- (b) How does myoglobin help in oxygen storage and transport? 2
- (c) Write a note on nitrogen fixation. 2
- (d) Mention the function of Zn in biological system. 2

3. (a) Explain the role of Na and K in biological system. 3
- (b) Write short notes on any *two* of the following : $2\frac{1}{2}\times 2=5$
- (i) Chelation therapy
 - (ii) Metalloenzyme
 - (iii) Vitamin B₁₂

UNIT—II

4. Answer any *three* questions : $3\times 3=9$
- (a) What do you mean by non-covalent interactions? Give two examples. $1+2=3$
- (b) How are nanomaterials classified? Give examples. 3
- (c) What are clay minerals? Mention the typical formula of kaolinite clay and its one application. $1+1+1=3$
- (d) How is solid-state reaction more advantageous over other conventional routes? Give one example. $2+1=3$

UNIT—III

5. Answer the following questions : $3\times 3=9$
- (a) What are 'stationary phase' and 'mobile phase' in chromatographic process? Name the phases used in column chromatography. $1+2=3$

- (b) What kind of information do you get from AAS? Give examples of one auxochrome and one chromophore. $1+2=3$
- (c) Describe the technique adopted in paper chromatography. How TLC has more advantage over paper chromatography? What is FTIR? $1+1+1=3$

Or

Write notes on the following : $1\frac{1}{2}\times 2=3$

- (i) Thin-layer chromatography
(ii) Molecular fluorescence spectroscopy

UNIT—IV

6. Answer the following questions :

- (a) Name three important constituents of paints. Write about the coloured pigments used in paint industry. $1\frac{1}{2}+1\frac{1}{2}=3$
- (b) What are the basic raw materials used for the manufacture of cement? Write the composition of Portland cement. Mention the role of gypsum in cement industry. $1+1+1=3$
- (c) Write short notes on any *two* of the following : $2\frac{1}{2}\times 2=5$
- (i) Principle of green chemistry
(ii) Pb poisoning
(iii) Hazard from radioactive fallout

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