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SEAT No. :

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M.Sc. - II

INORGANIC CHEMISTRY

**CHI - 445 : Inorganic Chemistry; Applications in Industry,
Environment and Medicine
(2013 Pattern) (Semester - IV)**

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any two sections of the following.*
- 2) Both sections should be written in the same answer book.*
- 3) All questions are compulsory.*
- 4) Figures to the right indicates full marks.*
- 5) Neat diagram must be drawn wherever necessary.*
- 6) Use of logarithmic table / calculator is allowed.*

SECTION - I

Applications in Industry

Q1) Answer the following:

[10]

- a) What is meant by natural or mineral pigments?
- b) What is meant by "Acid Bath"? Where is it used?
- c) Explain the use of chromium in dyeing of wool using azo dyes.
- d) What are the different processes available for electro deposition of zinc?
- e) Give, preparation and physical properties of Lithopone.

Q2) Answer the following: (any two)

[10]

- a) What are formazans? How are they classified as ligands? Give at least two examples of each and draw the structure of metal complexes they form.
- b) Explain the methods for electroplating of precious metals.
- c) Give two examples and draw structures of
 - i) Metallized dyes
 - ii) Additional reagents, and
 - iii) Medially metallized azodyes.
 - iv) How do complexes such as prussian blue and Ferrocene modify the behaviour of electrodes during electroplating?

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Q3) Write a note on any one:

[5]

- a) Alloy plating.
- b) Blue and Yellow pigment.
- c) Metal complexes of azo dyes.

SECTION - II

Environment

Q4) Answer the following:

[10]

- a) List the five provision of the clear water act. (CWA).
- b) What is powerball? How is the powerball manufactured?
- c) Draw a schematic diagram of a molten carbonate fuel cell. (MCFC). Write the reaction that occur at the cathode and anode.
- d) List the best option for energy sources for 21st century.
- e) What is the EPA maximum permissible level of the following metals, in drinking water?
 - i) Lead
 - ii) Arsenic
 - iii) Cadmium
 - iv) Mercury

Q5) Answer the following any two:

[10]

- a) Draw a schematic diagram that shows all of the component of an atomic absorption spectrometer (AAS). The Metal ion analyte has a positive charge, how does it become a neutral atom?
- b) What is meant by point and nonpoint sources of pollution? Give an example of each.
- c) The COD is a measure of what type of pollutant in water? Describe how you do a COD test on a water sample.
- d) Mercury (Hg^{2+}) has a $t_{1/2}$ of 8 days. If a person injects 3mg/day. Calculate the steady state concentration of mercury.

Q6) Write a note on any one: [5]

- a) Energy from Biomass.
- b) Water and Tidal Power.
- c) Industrial waste treatment.

SECTION - III

Applications of Metal Ions in Medicine

Q7) Attempt the following: [10]

- a) What are the modes of binding of Bismuth complexes to biomolecules?
- b) What is the significance of vanadium phosphate relation in living organism?
- c) What are chemotherapeutic drugs? Give two examples.
- d) What are chemical nucleases? What is their functions? Give one example.
- e) Which are the drugs used in treatment of Rheumatoid arthritis?

Q8) Answer any two: [10]

- a) Discuss the non-associative interactions of metal complexes with DNA.
- b) Explain the therapeutic role of Lithium.
- c) “Gold complexes show anticancer activity”. Explain.

Q9) Write short note on (any one): [5]

- a) Crysotherapy.
- b) Biomedical use of Lithium.

