GDF-2611-12-13 Seat No._____

M. Sc. (Sem. III) Examination

December – 2015

Chemistry : Paper - II

1. CHN - 602(O) Organic Chemistry

2. CHN - 602(I) Inorganic Chemistry

3. CHN - 602(P) Electro Chemistry

Time : 3 Hours] [Total Marks : 70

1. CHN - 602(O) Organic Chemistry

Instruction : All questions are compulsory and carry equal marks.

1 Answer any two : 14

(i) Write a note on batch versus continuous process.

(ii) Write a note on Design Flowcharts of plant.

(iii) What is unit process ? Give its importance in industrial organic chemistry. Discuss industrial importance of nitration.

(iv) Differentiate unit process and unit operations. Discuss the industrial importance of sulphonation.

2 Answer any two : 14

(i) Give an account of manufacture, different types of uses of soap.

(ii) What is detergent ? Give brief account of sulphate and sulphonate detergents.

(iii) Give an account of vanila and monosodium glutamate as food additives.

(iv) Write the sources of essential oils. Give the name of any four essential oils. Discuss general method for isolation of essential oils.

3 Answer any three : 14

(i) What is insecticides ? Give an account of chlorine containing insecticides.

(ii) Write note on fungicides and weedicides.

(iii) Give an account on plant hormones.

(iv) Discuss the hydrogenation of vegetable oil and give its importance.

(v) Discuss the method of production and industrial uses of cotton seed oil.

4 Answer any three : 14

(i) What is pulp ? Explain the manufacture of pulp by Kraft process.

(ii) Explain manufacturing process of viscose rayon.

(iii) Give the process of manufacturing of sugar.

(iv) Give synthesis and uses of derivatives of salicylic acid.

(v) Give synthesis and uses of following :

(a) Phenobarbital

(b) Diazepam

5 Answer any seven briefly : 14

(i) What is patent ?

(ii) What are the reagents used for the amination reaction ?

(iii) Define surfactants.

(iv) What is animal fixatives ? Give two examples.

(v) Give names of various preservatives.

(vi) What is celotex ?

(vii) What is black liquor ?

(viii) Which are the plant nutrients ?

(ix) What is the importance of bleaching in the manufacture of paper ?

(x) What is rodenticides ? Classify them.

2. CHN - 602(I) Inorganic Chemistry

Instructions : (1) All questions carry equal marks.
(2) Draw labelled diagram wherever necessary.

1 (a) Answer any two of the following questions : 14
(i) Define Metallo-porphyrin and explain the structure of any one.
(ii) Explain the structure and mechanism of Dioxygen carrier.
(iii) Discuss the role of Cytochrom-C in the reduction of O_2.

(b) Answer any one of the following questions :
(i) Explain 'Ferredoxin'
(ii) Discuss the structure and importance of 'Myoglobin'.

2 (a) Answer any two of the following questions : 14
(i) Write a note on 'Zinc Fingers'.
(ii) Justify the statement : "Molybdenum is essential to all nitrogen fixing organisms."
(iii) Discuss characteristics and structure of 'Cyano cobalamin'.

(b) Answer any one of the following questions :
(i) Discuss importance of 'Cu' and 'Cu-based disorders'.
(ii) Describe various activity associated with Vanadium in biochemistry.

3 (a) Answer any two of the following questions : 14
(i) Discuss "Monsanto acetic acid process".
(ii) What do we mean by "Migratory insertion" reaction ? Explain with illustration.
(iii) Describe the synthesis of liquid hydrocarbon fuels from coal.

(b) Answer any one of the following questions :

(i) Describe the use of 'Wilkinson Catalyst' in Hydrogenation of alkenes.

(ii) Explain reductive elimination reaction with suitable example.

4 (a) Answer any two of the following questions : 14

(i) What are similarity properties between Np, Pu and Am ?

(ii) Give brief account of oxides and halides of transuranic elements.

(iii) Discuss the chemistry involved in the various methods used to extract and separate Np and Pu.

(b) Answer any one of the following questions :

(i) Give the electronic configuration and oxidation state of transuranic elements.

(ii) Explain the use of transuranic elements in smoke detectors.

5 Answer any seven of the following questions : 14

(a) What is Enzyme and Co-enzyme ?

(b) What is Bioinorganic Chemistry ?

(c) 'Low sulphate excretion caused due to deficiency of Molybdenum' – true or false ?

(d) Give example of organometallic compound of any one trans uranic element.

(e) Write the formula of Zeise's salt.

(f) Calculate total electron count in organo-metallic compound $[W(CH_3)_6]$

(g) What is Sanwich structure ?

(h) Give the name of the ores of Plutonium.

(i) The colour of Pu^{3+} and Cm^{4+} ions are ?

(j) Define : 'Urenides'.

3. CHN - 602(P) Electro Chemistry

Instructions : (1) All questions are compulsory.

(2) Figures to the right indicate maximum marks.

(3) Answer the questions accurately and appropriately.

Constants :

$h = 6.625 \times 10^{-34}$ J.s

$R = 8.314$ J/K mol

$k_B = 1.38 \times 10^{-23}$ J/K

$N_A = 6.023 \times 10^{23}$ per mol

1 (a) Answer any two of the following questions : **10**

(i) Derive Debye Huckel Onsagar conductance equation and discuss its validity for aqueous and non aqueous solution.

(ii) Define the term 'transference number', and describe an experimental method for its determination.

(iii) What is ionic mobility ? Discuss the various factors affecting ionic mobility.

(b) Solve any one of the followings : **4**

(i) The equivalent conductance at 18° of a normal solution of KCl is 98.2 mho cm^2/ equiv and for infinite dilution at the same temperature 131 mho cm^2/equiv. Calculate the degree of dissociation of KCl at this dilution.

(ii) In electrolysis of copper sulfate between copper electrodes the total mass of copper deposited at the cathode was 0.153 g and the masses of copper per unit volume of the anode liquid before and after electrolysis were 0.79 and 0.91 g respectively. Calculate the transport number of the copper and sulfate ions.

2 Answer any two of the following questions : 14

(i) What is self-ionization of water ? Describe conductrometric method for determination of ionic product of water.

(ii) Explain the term dissociation constant of an acid ? Describe an EMF method for the determination of dissociation constants of poly basic acids.

(iii) Give a resume of the 'ampholytes'.

3 Answer any two of the following questions : 14

(i) What are the causes of hydrogen overvoltage ? Explain Tafel's theory of hydrogen over voltage.

(ii) Explain the term 'decomposition potential'. How it is experimentally measured ? On what factors the decomposition potential depends ?

(iii) Brief resume of electrolytic oxidation and reduction.

4 Answer any two of the following questions : 14

(i) Describe the mechanisms and applications of various electrokinetic phenomena.

(ii) Explain zeta-potential and streaming potential with proper illustration. How does zeta-potential desribe colloidal stability ?

(iii) Discuss probability of electron tunneling though barriers of charge transfer.

5 Answer any seven of the following short questions : 14

(i) Explain why the transport number of cadmium ion in cadmium iodide solution at high concentration may become zero or negative.

(ii) Fill the blanks : The specific conductivity increases with _____ in concentration of a solution, whereas the molar conductance increases with _____ in concentration. (increase/decrease)

(iii) How can limiting equivalent conductivity be determined for strong electrolytes ?

(iv) Why do lithium salts show lower conductivities compared to those of cesium salts in water?

(v) What is cathodic and anodic overvoltage ?

(vi) What is concentration polarization ? How it can be minimized ?

(vii) Differentiate the metal deposition and metal dissolution.

(viii) Fill the blank : Electrokinetic phenomena occur in _____ fluids.

(heterogeneous/homogeneous)

(ix) What is the driving force in 'capillary osmosis' ?

(x) 'Ion concentration is affecting the zeta potential' – Justify the statement.
