M. Sc. (Sem. III) Examination

December – 2015

Chemistry

1. CHN-601(O) : Organic Chemistry
2. CHN-601(I) : Inorganic Chemistry : Paper - I
3. CHN-601(P) : Physical Chemistry

Time : 3 Hours]   [Total Marks : 70

1. CHN-601(O) : Organic Chemistry

Instructions :
   (1) All questions are compulsory and carry equal marks.
   (2) The medium of answers is English only.

1   Answer any two :   14
   (1) Discuss the determination of the structure of anthocyanins.
   (2) Discuss the structural and biogenatic relationship between flavonols (quercetin), anthocyanidin (cyanidin chloride) and catechins.
   (3) Give evidence for following in chlorophyll and Haemine.
      (i) Reductive degradation of haemine.
      (ii) Oxidative degradation of chlorin-e.

2   Answer any two :   14
   (1) What are terpenoids ? Discuss the constitution of Abietic aid.
   (2) Discuss the constitution of Cadinine.
   (3) Prove the structure of triterpenoids.

3   Answer any three :   **14**
     (1) What are vitamins ? Discuss their classification and nomenclature.
     (2) Discuss the constitution of Vitamin-E.
     (3) Give analytical evidences for the structure of Riboflavin.
     (4) Biological importance of Nicotinic acid (Vitamin B_3)
     (5) Describe the structure and synthesis of ascorbic acid.

4   Answer any three :   **14**
     (1) Give evidence for structure of reserpic acid.
     (2) Discuss the constitution of strychnine.
     (3) What are alkaloids ? Discuss their classification, isolation and their uses.
     (4) Biosynthesis of alkaloids.
     (5) Give evidence for the nature/ring size B and C in cholchicin.

5   Answer any seven :   **14**
     (1) What is the basic structural unit of Cyanin chloride ?
     (2) How many α and β chains are present in haemoglobin and what is its end group ?
     (3) What is the basic structure of Porphin ?
     (4) Give the structure of Retinol.
     (5) Explain the deficiency of Vitamin D_2. Which disease's poroduced ?
     (6) Discuss oxidative degradation of haemin.
     (7) Synthesis of polyporic acid.
     (8) Ozonolysis of phytol.
     (9) Structure of chlorophyll.
     (10) Evidence for presence of a phytyl group in chlorophyll-a.

2. CHN-601(I) : Inorganic Chemistry : Paper - 1

Instruction : All questions carry equal marks.

1 Answer any two of following :

(a) Discuss the difference between ESR and NMR.

(b) Discuss the ESR spectra of the following :

   (i) Bis (Salisaldimato) Copper II

   (ii) $[Co(H_2O)_6]^{+3}$ Co I=7/2

(c) What are the limitations of NQR spectroscopy ? Write note on 'Towns-Dailey's' formula.

(d) Explain the application of NQR spectra.

2 Answer any two of following :

(a) Discuss the X-Ray photoelectron spectroscopy.

(b) Explain the principle of valence-Electron spectroscopy.

(c) Compare the U.V. photoelectron spectrum of N_2 and O_2.

(d) Discuss the applications of X-ray photoelectron spectroscopy.

3 Answer any two of the following :

(a) Discuss the methods of measurement of magnetic susceptibility.

(b) Write a note on paramagnetism.

(c) Explain the term intra and inter molecular antiferromagnetism.

(d) Discuss the orbital contribution of d-orbitals on spin magnetic moment.

4 Answer any two of the following :

(a) Write a note on OMC of Al.

(b) Discuss the M-C bond in OMC.

(c) Discuss in brief the classification of OMC.

(d) Explain the bond and structure of Olifine and Cyclopentadine complex compounds.

5 Write any seven of the following :

(a) What is ESR spectra ?

(b) What is binding energy ?

(c) What is ESCA ?

(d) Give Frank-Condon principle.

(e) Draw the instrument of PES.

(f) Give the reaction of Ziegler-Natta.

(g) What is PES ?

(h) What is shape process ?

(i) What is OMC ?

(j) Give the ESR spectram of Methyl radical.

3. CHN-601(P) : Physical Chemistry

Instructions : (1) Attempt all questions.

(2) All questions carry equal marks.

1 (a) Attempt any two of the following :   2×5=10

(i) Derive the equation for rate constants and life times of biomolecular photochemical reactions.

(ii) Give classification fo photochemical reactions.

(iii) Explain photo-fragmentation taking example of gas phase photolysis.

(iv) Explain the role of photochemistry in isomerism with examples of substituted ethylenes.

(b) Answer one of the following :   1×4=4

(i) Explain Photoreduction in dyes considering thermodynamical feasibility.

(ii) Give detailed review of photo-oxygenation considering 'ene' reaction.

2 (a) Attempt any two of the following :   2×5=10

(i) Derive an equation for B.E.T. isotherm.

(ii) Define adsorption and give characteristics of different types of adsorption phenomena.

(iii) Explain heterogeneous catalysis on the basis of adsorption theory and derive an equation for it.

(iv) Explain thermodynamics of adsorption and how can these thermodynamical properties can be calculated.

(b) Attempt any one of the following :   1×4=4

(i) Discuss various types of Adsorption Isotherms.

(ii) Derive an equation for Freundlich's adsorption isotherm.

3 (a) Write notes on any two of the following : 2×5=10

(i) Discuss in detail perfect and imperfect crystals.

(ii) Explain various types of solid state reactions.

(iii) Discuss methods of crystal growth.

(iv) Explain thermodynamics of Schottky defects.

(b) Attempt any one of the following :   1×4=4

(i) Difference between amorphous and crystalline solids.

(ii) Differences between conductors and superconductors.

4 (a) Answer any two of the followings :   2×5=10

(i) Explain Instrumentation, Calculation of Vibrational frequencies and interpretation of IR spectra.

(ii) Discuss principle of optical rotatory dispersion (ORD) and circular dichroism. (CD)

(iii) Explain differences between Spin-spin coupling splitting in NMR spectroscopy.

(iv) Explain principle and instrumentation in UV-chiroptical spectroscopy.

(b) Attempt any one of the following :   1×4=4

(i) Sheilding and De-sheilding

(ii) Linearly and circularly polarised light.

5   Define any seven from the followings :   2×7=14

(i) Thermodynamical Point defects.

(ii) Surface films

(iii) Surface tension

(iv) Orthonormal function

(v) Einstein's law of quantum yield

(vi) Crystallisation and growth of crystals

(vii) Voids due to close packing

(viii) Detector used in ^1H spectroscopy

(ix) Operating frequency in ^1H NMR spectroscopy.

(x) $^{13}C - {}^1H$ coupling.

————

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'.

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 cm²/ equiv and for infinite dilution at the same temperature 131 mho cm²/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.

GDF-2611-12-13]   6   [Contd...

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.

———

M. Sc. (Sem. III) Examination

December – 2015

CBO-501 : Botany

(Plant Physiology)

Time : 3 Hours]   [Total Marks : 70

Instructions :
(1) There are two sections in this question paper, both are compulsory and carry equal marks.
(2) Write answers of section I and section II in separate answer books.
(3) Figures in brackets indicate marks of sub-questions.
(4) Give your answers with neat and labelled diagrams wherever required.

SECTION I

1 Describe in detail : (any two)   **14**

   (i)   Influence of hormones and environmental factors on plant senescence.

   (ii) Types and causes of seed dormancy.

   (iii) Physiological aspects of seed germination.

2 Describe in detail : (any three)   **14**

   (i)   Hypersensitive response.   **5**

   (ii) Stress and stressful environments.   **5**

(iii) Mechanism of acquisition and transport of phosphorous in plants. 5

(iv) Salt stress resistant plants. 4

(v) Abiotic stress. 4

4

3 Describe in brief : (any four)

(i) Role of potassium in plants. 7

(ii) Programmed Cell Death. 2

(iii) Essential micronutrients in plants. 2

(iv) The form of iron and potassium usually taken up by the plants from the soil. 1

(v) Secondary dormancy. 2

(vi) Types of seed germination. 2

SECTION II

4 Describe in detail : (any two) 14

(i) Light harvesting complex and photo systems.

(ii) Gluconeogenesis

(iii) Hatch and Slack cycle and its ecological significance in plants.

5 Describe in detail : (any three)

(i) Photoperiodism and its types. 5

(ii) Physiological effects of Gibberllic acid on plants. 5

(iii) Role of light in floral induction. 5

(iv) Salicyclic acid. 4

(v) Effect of Ethylene on fruit ripening. 4

6   Describe in brief : (any four)   7

     (i)   Location of Oxidative phosphorylation   2
and Photophosphorylation.

     (ii)   Draw CAM cycle.   2

     (iii)   First stable compounds of C_3 and C_4 cycle.   1

     (iv)   Differentiate between : ABA and IAA.   2

     (v)   Full form of PPP and its role in plants.   2

     (vi)   Write full name of IBA.   1

———————

M. Sc. (Part - II) (Sem. III) Examination
December – 2015
CBO : 502 - Botany (CC)
Plant Resource Utilization, Conservation and Biometry (New Course)

Time : 3 Hours]   [Total Marks : 70

Instructions :

(1) There are two sections in this question paper, both are compulsory and carry equal marks.

(2) Write answers of Section I and Section II in separate answer books.

(3) Figures to the right indicate marks of sub question.

(4) Give your answers with neat and labelled diagrams wherever required.
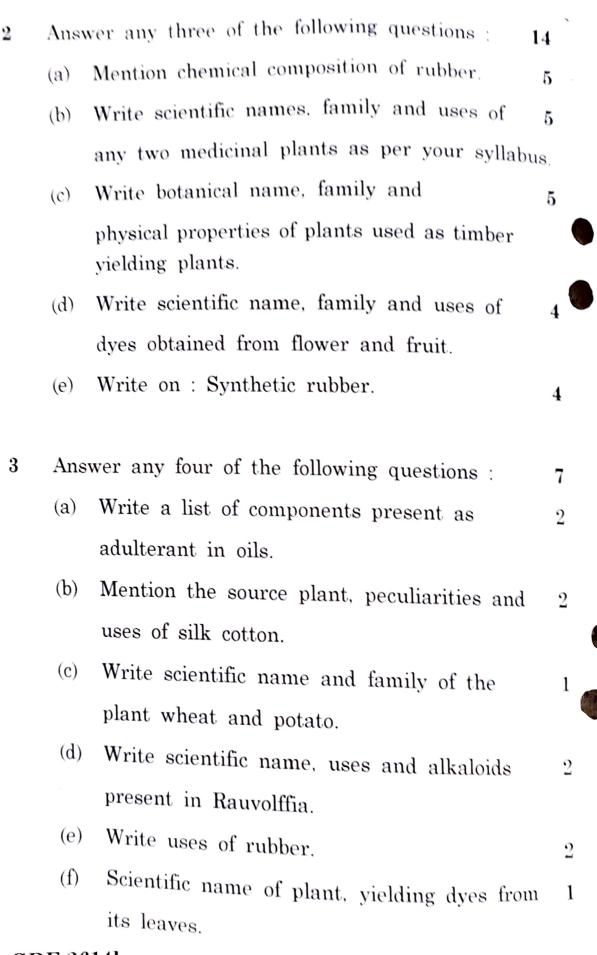
SECTION - I

1 Describe any two of the following questions.   14

(a) Different kinds of plant fibers.

(b) Origin and uses of fodder crops.

(c) Adulteration in plant products.

2   Answer any three of the following questions :   14

   (a)   Mention chemical composition of rubber.   5

   (b)   Write scientific names, family and uses of   5
any two medicinal plants as per your syllabus.

   (c)   Write botanical name, family and   5
physical properties of plants used as timber
yielding plants.

   (d)   Write scientific name, family and uses of   4
dyes obtained from flower and fruit.

   (e)   Write on : Synthetic rubber.   4

3   Answer any four of the following questions :   7

   (a)   Write a list of components present as   2
adulterant in oils.

   (b)   Mention the source plant, peculiarities and   2
uses of silk cotton.

   (c)   Write scientific name and family of the   1
plant wheat and potato.

   (d)   Write scientific name, uses and alkaloids   2
present in Rauvolffia.

   (e)   Write uses of rubber.   2

   (f)   Scientific name of plant, yielding dyes from   1
its leaves.

GDF-2614]
2
[Contd...

4 Describe any two of the following questions :   **14**

   (a)   Botanical survey of India (BSI).

   (b)   Strategies for conservation – ex situ.

   (c)   National Parks in Gujarat.

5 Answer any four of the following questions :   **14**

   (a)   Describe : Regression.   **5**

   (b)   Write types of probability distribution.   **5**

   (c)   Discuss : Mann-Whitney (U) test.   **5**

   (d)   Write procedure to calculate chi-square.   **4**

   (e)   Describe : Analysis of variance.   **4**

6 Answer any four of the following questions.   **7**

   (a)   Write activities of CSIR.   **2**

   (b)   Write role of DBT in conservation.   **2**

   (c)   Write full form of NBPGR.   **1**

   (d)   Write types of correlation.   **2**

   (e)   Define : Sampling.   **2**

   (f)   Define : Probability.   **1**