GDF-2601-02-03 Seat No._____

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 - I

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 ^{1}H spectroscopy

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

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