KKI-6252-53-54-56 Seat No._____

M. Sc. (Sem. III) Examination

November / December – 2014

Paper - III : CHN - 603(I)

1. Organic Chemistry

2. Inorganic Chemistry - (Corrosion)

3. Inorganic - (Coord)

4. Physical Chemistry (P) (New Pattern)

Time : 3 Hours] [Total Marks : **70**

1. Organic Chemistry

Instructions : (1) All questions are compulsory.
(2) Figures to the right indicate marks.

1 Answer any two of the following : **14**

(a) Explain approaches of the drug design.

(b) Discuss modern methods of pharmaceutical analysis.

(c) Write definition, examples and uses of vehicles, suspending agents, surfactants and emulsifying agents.

2 Answer any two of the following : **14**

(a) What is antibiotics ? Classify antibiotics on the basis of their sources.

(b) Explain the structure of chloramphenicol with its synthesis.

(c) Give the synthesis of 6-amino penicillanic acid.

3 Answer any two of the following : 14

(a) Give the synthesis of sulphathiadiazole and sulphalene.

(b) Write preparation of cibazole and sulphamerazine and uses of sulphanilamides.

(c) Give the synthesis of suphaguanidine and suphafurazole.

4 Answer any two of the following : 14

(a) Give brief account of local anesthetics.

(b) Give an account on cholinergic drugs. Explain synthesis, uses and physiological activities of any two cholinergic drugs.

(c) Discuss the chemistry of histamine drugs.

5 Answer any seven of the following : 14

(a) Distinguish between drug and medicine.

(b) Write any two name of reference books and author's name of medicinal chemistry.

(c) Define : Diagnostic agents.

(d) Write short note on radio opaque compounds.

(e) Give uses of penicilline.

(f) Write synthesis of tropine.

(g) What is cephalosporins ?

(h) Give synthesis of any one polyne antibiotics.

(i) Write definition and two uses of antihistamine drugs.

2. *Inorganic Chemistry - (Corrosion)*

1 Answer any two of the following :

(1) Represent pourbix diagrams with their utility and limitations.

(2) Write electrochemical series and explain its limitations.

(3) Discuss the factors that encourage the intergranular corrosion and write the steps to decrease this corrosion.

(4) Discuss the effects of pH on corrosion.

2 Answer any two of the following :

(1) Explain the role of moisture, dust particles and gases in atmospheric corrosion of iron.

(2) Write a short note on an atmospheric corrosion.

(3) Discuss the application of passsivators.

(4) Define the term polarisation. Give the reason for decreasing over voltage.

3 Answer any two of the following :

(1) Explain Wagner theory of corrosion.

(2) Discuss about sacrificial anode.

(3) Write a short note on oxidation resistance alloy.

(4) Explain the corrosion of underground pipe and discuss the methods for preventation of this corrosion.

4 Answer any two of the following :

(1) Write a short note on corrosion fatigue.

(2) Discuss stay current corrosion and the methods for preventing it.

(3) Write a short note on 'Fretting corrosion'.

(4) Discuss the factors affecting the corrosion of iron and steel.

5 Answer any two of the following :

(1) Discuss the classification of coating for corrosion resistance.

(2) Write a short note on 'Pitting corrosion'.

(3) Write a short note on 'Dizincification'.

(4) Write a short note on 'Uniform attack'.

1 Answer any two questions from the following : **14**

(a) Find out the value of $P_3(\cos\theta)$.

(b) Using Euler's identity prove that

$$\left\langle 1 \left| x^4 + y^4 \right| 1 \right\rangle = \frac{3}{4} r^4 \sin^4\theta .$$

(c) Evaluate the integral $\int_0^{\pi} \theta_2^1 \, \theta_4^0 \, \theta_2^1 \sin\theta d\theta$.

Given : $\theta_2^1 = \sqrt{\frac{15}{4}} \sin\theta \cos\theta,$

$$\theta_4^0 = \sqrt{\frac{9}{128}} \left(35\cos^4\theta - 30\cos^2\theta + 3\right)$$

2 Answer any two questions from the following : **14**

(a) Explain step up and step down operators of angular momentum.

(b) Derive the equation $\chi(\alpha) = \dfrac{\sin\left(l + \frac{1}{2}\right)\alpha}{\sin\frac{\alpha}{2}}$.

(c) Prove that $\left[L_+, L_-\right] = 2\hbar L_z$.

3 Answer any two questions from the following : **14**

(a) Prove that $\langle 3, -2 \rangle = \Phi_{-2}\Phi_0$.

(b) Prove that $\langle \pm 1 | Vo | \pm 1 \rangle = -Dq$.

(c) Prove that $\psi_1 = \sqrt{\frac{1}{24}} \left[\sqrt{15}\,\langle 3 \rangle - 3\langle -1 \rangle\right]$ at

$E = -6\,Dq$.

4 Answer any two questions from the following : 14

(a) Explain vibronic coupling by taking suitable example.

(b) Explain selection rule.

(c) Explain the Jahn - Tellor theorem.

5 Answer any seven questions from the following : 14

(1) What are the values of D and q in Dq in the energy diagram ?

(2) What are the values of l and n for $4d$- orbital ?

(3) What is the value of famous $1/r_{ij}$ term ?

(4) What are the values of angular momentum operators L_+ and L_- ?

(5) What is the value of dT in terms or r, θ and ϕ in Jacobian ?

(6) What is the value of the wave function Ψ_4 for $E = 2\,Dq$?

(7) Which factors affect the stability of the complexes ?

(8) What are strong field and weak field ?

(9) What are the values of L_+ and L_- ?

(10) What is JJ coupling ?

4. Physical Chemistry (P) (New Pattern)

Instructions : (1) All questions are compulsory.
(2) Figures to the right indicate maximum marks.
(3) Answer the questions accurately and briefly.

1. (A) Answer any TWO of the following questions. **10**

I. Elaborate the classification of polymers based on their structure.

II. Explain what is intermolecular bonding and how many types of intermolecular forces are present?

III Discuss at least three ways the polymers: PS and PE, can be distinguished using modern instruments.

(B) Answer any ONE of the following questions. **4**

I. Why do the molecular weight of a polymer sample is expressed as some average of individual molecules?

II. Differentiate the isotactic, syndiotactic, and atactic polymers with illustrations.

2. Answer any TWO of the following questions. **14**

I. Brief resume of the kinetics of anionic polymerization.

II. Show the mechanism of the free radical polymerization of ethylene using benzoyl peroxide as an initiator. "In free radical polymerization, the degree of polymerization increases with an increasem monomer concentration and a decrease of initiator concentration" –Justify the statement.

III. Compare monometallic and bimetallic mechanism of polymerization. Why coordination polymerization is known as Insertion polymerization?

3. Answer any TWO of the following questions. **14**

I. What is the importance of knowing Tg and Tm of polymer in plastic industry? Describe W.L.F. equation method for determination of glass transition temperature.

II. Describe the factors that affect glass transition temperature? A sample of polypropylene has a glass transition temperature of +5°C while a sample of polyvinyl chloride has a glass transition temperature of +81 °C. Clearly explain this difference.

III. What are the factors that affect glass transition temperature? Discuss them with proper illustration. Why do polyamides have higher melting points than those polyolefins?

4. Answer any TWO of the following questions, 14

I. What is meant by degree of crystallinity? Discuss its importance. How is it measured?

II. Compare random and chain end degradation. Predict the products for the same using suitable polymers.

III. Enumerate the specific group polymer reactions with suitable illustrations.

5. Answer any SEVEN of the following short questions. 14

(1) Differentiate LDPE and HDPE.

(2) Explain the terms: Swelling of polymers, and Crystallizability.

(3) How monomers will be freed from the inhibitors before use?

(4) What is the average life of a paper, plastic bag and plastic bottle? What is the significance of an average life of polymer for the environmental issue?

(5) Suggest the unique applications of polyacrylic acids, and kevlar plastic.

(6) Differentiate oligomers from high polymers with proper illustration.

(7) What are inhibitors? Give two examples.

(8) What are surfactants? What are their characteristics?

(9) Give a very brief account of sperullites.

(10) Which compounds do use in polymerization processes in plastic industries? Why?