

St. Mary's P.G. College , Vidisha , M.P.

M.Sc. Ist Sem. { Chemistry} - Dec.2020

Inorganic Chemistry – I

Note : - Attempt all the questions.

Unit – 01.

Q.(01) : - Write note on :- (I) $d\pi - d\pi$ bonding . (II) Bent Rule .

OR

What do you mean by VSEPR theory ? Give its postulates & limitations ?

Unit – 02.

Q.(02) : - Describe the factor affecting the stability of metal complexes ?

OR

Describe the continuous variation (Job's method) for determination of stability Constant ?

Unit – 03.

Q.(03) : - Write note on :- (I) Mechanism involved in one electron transfer .

(II) Factors affecting the rates of substitution reaction .

OR

What do you understand by labile and inert complexes of octahedral complexes according to Crystal field theory ?

Unit – 04.

Q.(04) : -Give reasons why Molecular orbital theory is preferred over Crystal field theory ?

OR

What is Crystal field theory ? Write its features & limitations ?

Unit – 05.

Q.(05) : - Describe Pearson's HSAB principle and its applications with examples ?

OR

Explain the following : - (I) E-C equation . (II) Symbiosis .

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M.Sc. Ist Sem. { Chemistry } - Dec.2020

Mathematics for Chemist

Note : - Attempt all the questions.

Unit – (01)

Q.(01) : - Explain the following – (I) Dot & Cross product of Vectors. (II) Unit Matrix .

(III) Divergence of Vector field. (IV) Transpose of Matrix .

OR

Find the inverse of the following matrix -

$$\begin{bmatrix} 2 & 3 & 1 \\ 1 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

Unit – (02)

Q.(02) : - What are the maximum & minimum value of y in this equation. $y = 2x^3 - 3x^2 - 12x + 5$.

OR

Differentiate with respect to x – (a) $x / (x + 1)^2$. (b) $\log (\log x)$.

Unit – (03)

Q.(03) : - Integrate the following with respect to x –

$$\int x \cdot \cos x \, dx \quad \text{OR} \quad \int dx / (1 - \sin x)$$

Unit – (04)

Q.(04) : - Write the solution of the differential equation –

$$d^2y / dx^2 = x^2. \quad \text{OR} \quad 2(x + 1) \cdot dy / dx - a(y + 2) = 0.$$

Unit – (05)

Q.(05) : - How many words can be formed taking all letters of the word “ CHEMISTRY “. How many of these will begin with “ C “ and end with “ y “ .

OR

In how many ways 11 players out of 16 cricket players can be selected .

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M.Sc. IIIrd Sem. { Chemistry } – Dec.2020

Organo transition metal

Note : - Attempt all the questions.

Unit:-(01)

Q.(01) :- Discuss the general methods of preparation of transition metal alkyls.

OR

What are Carbines ? Explain Singlet and Triplet Carbines.

Unit:-(02)

Q.(02) :- With suitable examples, explain the structure and bonding of alkyne complexes of transition metals.

OR

Explain the general method of preparation of butadiene complexes.

Unit:-(03)

Q.(03) :- Discuss the preparation and nature of bonding in di-hydrogen complexes .

OR

Explain the important properties of transition metal hydride complexes.

Unit:-(04)

Q.(04) :- What do you mean by Zeigler - Natta polymerization? Explain with suitable example.

OR

Define hydrocarbonylation of olefins.

Unit:-(05)

Q.(05) :- Explain dynamic equilibrium of compounds of η^3 - allyl complexes .

OR

Discuss fluxionality with suitable example.

Barkatullah Vishwavidyalaya , Bhopal [M.P.]

Session – Dec. 2020

College Name : - 117 , St. Mary's P.G. College , Vidisha [M.P.]

Student's Name : -

Father's Name : -

Mother's Name : -

Class : -

Subject : -

Name of Paper : -

Examination Mode : - Regular / ATKT / Ex.

Enrollment No. : -

Roll No. : -

Medium :-

No. of written Page : -

Submit Date : -

Student's Signature : -

Name of Receiver : -

Signature of Receiver : -

Used Only For Examiner

Question No.	Q. 01	Q. 02	Q. 03	Q. 04	Q. 05	Total Marks
Obtained Marks						

In words : -

Signature of Examiner : -

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M.Sc. 1st Sem. { Chemistry } - Dec.2020

Spectroscopy and Group Theory - I

Note : - Attempt all the questions.

Unit – 01.

Q.1 : - Define symmetry elements and symmetry operations ?

Or

Write note on Schonflies symbol ?

Unit – 02.

Q.2 : - What is reduced mass ? how it is calculated ?

Or

Why microwave Spectroscopy study only in the gaseous state of atoms or molecules? Unit – 03.

Q.3 : - What is the difference between infrared and Raman spectroscopy ?

Or

Explain Stokes and antistokes lines in Raman spectra ?

Unit – 04.

Q.4 : - Explain charge transfer spectra ?

Or

Describe the application of microwave spectroscopy ?

Unit – 05.

Q.5 : - Write short note on (any two) ?

(A) Charge transfer spectra (B) Predissociation (C) Photoelectron spectra .

Or

Explain the theory and application of Franck-Condon principle

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M.Sc. 1st Sem. { Chemistry } - Dec.2020

Physical chemistry - I

Note : - Attempt all the questions.

Unit – 01.

Q1:- Write short note on eigenvalues and eigenfunctions ?

Or

Give the description of Gibbs free energy by gifts for Gibbs helmholtzequation?

Unit – 02.

Q2:- Explain extended huckel theory ?

Or

Describe variation of chemical potential with temperature ?

Unit – 03.

Q3:- Express internal energy of a system in terms of partition function?

Or

Solve the Schrodinger Wave Equation for particle in one dimensional box ?

Unit – 04.

Q4:-Apply the molecular orbital theory to cyclobuta Diene?

Or

What are electron spin and antisymmetry? explain in the light of paulis principal ?

Unit – 05.

Q5:- Compare Bose Einstein and fermi-diracstatistic ?

Or

Define partialMolalproperties how it can be determined ?

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M.Sc. 1st Sem. { Chemistry } - Dec.2020

organic chemistry - I

Note : - Attempt all the questions.

Unit – 01.

Q1:- Describe aromaticity on the basis of huckel Molecular orbital theory ?

Or

Write the short notes on any two of the following ?

(I)Cross conjugation (II) Resonance (III)Hyperconjugation (IV)Crown Ether complexes

Unit – 02.

Q2:-Write the short notes on any two of the following ?

(I)Optical isomerism (II)Hammett equation (III) Reaction profile diagram

Or

Describe briefly element of symmetry and chirality ?

Unit – 3..

Q3:- Explain the stability and reactivity of free radicals ?

Or

What do you mean by transition state structures ?

Unit – 04.

Q4:- Write the short notes on SN1 and SN2 reactions ?

Or

Describe the effect of conformation on reactivity ?

Unit – 05.

Q5:- Explain any two of the followings ?

(I)Isotope effect (II) Phase transfer catalysis (III)Anchimeric assistance

Or

Write note on Carbon cation and anion generations structures and stability ?

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M.Sc. 1st Sem. { Chemistry} - Dec.2020
Biology for chemist

Note : - Attempt all the questions.

Unit – 01.

**Q1:- What are some important achievement in
(A.) Animal cell cultures (B) Plant cell cultures**

Or

What is the chemical compositions of plant and animal cells descriptions brief ?

Unit – 02.

Q2:- Describe in brief the structure of RNA ?

Or

Explain how the presence of six -OH groups affect the solubility and properties of glucose?

Unit – 03.

Q3:- Describe in brief the structure and function of cholesterol ?

Or

Write short notes on chemical hydrolysis of nucleic acids ?

Unit – 04.

Q4:- Write short notes on absorption of carbohydrates ?

Or

Destruction in detail the biosynthesis of amino acids ?

Unit – 05.

Q5:- Explain the double helix model of DNA ?

Or

Describe in detail about ATP is the biological energy currency ?

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M.Sc. 3rd Sem. { Chemistry} - Dec.2020

Application of spectroscopy - III

Note : - Attempt all the questions.

Unit – 01.

Q1:- Write about Laporte selection rule?

Or

Determine all the IR active vibrations and sketch them for the CFC, CF₂Cl₂ and another greenhouse gases?

Unit – 02.

Q2:- What is net magnetization and how does it apply to NMR?

or

What is shielding and deshielding in NMR can you give an example?

Unit – 03.

Q3:- Explain spin spin interaction of NMR?

Or

What is Mossbauer Spectroscopy explain

Unit – 04.

Q4:- Describe the electronic structures of square planar complexes?

Or

Describe vibrational normal modes in polyatomic molecules?

Unit – 05.

Q5:- Describe correlation for protons bonded to carbon aldehydic compound?

Or

Discuss the spin spin coupling in NMR spectroscopy ?

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M.Sc. 3rd Sem. { Chemistry } - Dec.2020

Photochemistry

Note : - Attempt all the questions.

Unit – 01.

Q 1:- Draw and explain joblonski diagram ?

OR

Explain the effect of light intensity on the rate of the photochemical reaction ?

Unit – 02.

Q2:- Write the mechanism of the arrangement of 1,4,-diene ?

OR

Describe the geometrical isomerism in alkenes ?

Unit – 03.

Q3:- Explain the photochemistry of vision ?

OR

Explain the singlet and triplet state?

Unit – 04.

Q4:- Difference between Phosphorescence and fluorescence ?

OR

Discuss the various type of photochemical reactions?

Unit – 05.

Q5:- Write short notes on (any two) ?

(A) Photo isomerisation of benzene (B) Photo edition reactions in aromatic compounds

(C) Rearrangement of 1,5-diene **OR**

write a note on photo degradation of polymers ?

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M.Sc. 3rd Sem. { Chemistry } - Dec.2020

Environmental Chemistry

Note : - Attempt all the questions.

Unit – 01.

Q1:- What are bio Geochemical cycles ?

Or

What accounts for numeral difference between dry lapse rate and wet lapse rate ?

Q2:- Write are damaging effect of carbon monoxide ?

Or

Write a short notes on greenhouse gases and global warming ?

Q3:- What is toxicity how to heavy metal causes it?

Or

Writetreatment of waste andsewage ?

Q4:- Write an essay on the remediation of soil ?

Or

What is air pollution what are its major sources ?

How can air pollution be minimised ?

Q5:- What do you understand by Primary secondary and tertiary treatment of water ? explaincategorically in detail ?

Or

What is smog ?in what ways smog is harmful to man? is there any difference between London type smog and loss and angles typessmog explain in detail ?

Or

Give a detailed account of poly chlorinated biphenyls ?

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M.Sc. IIIrd Sem. { Chemistry} - Dec.2020

Polymer

Note : - Attempt all the questions.

Unit – 01.

Q1:- Give classification of polymers on the basis of their properties ?

Or

Describe x-ray diffraction study for polymers ?

Unit – 02.

Q2:-Discuss polymerization in homogenous and heterogeneous system?

Or

Write notes on : - (a.) Numeric weight (b.) Viscosity average weight

Unit – 03.

Q3:- Discuss polydispersity for Molecular weight distribution of polymer ?

Or

Discuss hardness and abrasion resistance of polymer ?

Unit – 04.

Q4:- Discuss the structure and properties of borazine ?

Or

Define inorganic Polymers with examples ?

Unit – 05.

Q5:- Describe ultracentrifugation method ?

Or

Describe the following : -

(A) Addition polymerization (B) Condensation polymerization

उत्तर पुस्तिका के संबंध में निर्देश

1. विद्यार्थी स्वयं के पास उपलब्ध A-4 आकार के कागज से 16 पेजों की(दोनों तरफ मिलाकर) उत्तर पुस्तिका बनाकर उत्तर लिखेंगे ।
2. उत्तर पुस्तिका का प्रथम पेज विभाग के निर्देशानुसार बनेगा ।
3. विद्यार्थी उत्तर पुस्तिका के हस्तलिखित पेजों की संख्या अनिवार्य रूप से दर्ज करेंगे।
4. विद्यार्थी उत्तर लिखने के लिए केवल नीले या काले बाल पेन का ही उपयोग करेंगे।
5. विद्यार्थियों को समस्त विषयों की प्रश्नपत्र वार प्रथक प्रथक उत्तर पुस्तिका लिखना अनिवार्य होगा।
6. विद्यार्थी विभाग द्वारा घोषित समय सारणी के अनुसार समस्त प्रश्न पत्रों की लिखित उत्तर पुस्तिकाएं अपने विभाग में एक साथ जमा करेंगे।
7. उत्तर पुस्तिका तथा प्रैक्टिकल रिकॉर्ड निर्धारित तिथि / अवधि के पश्चात प्राप्त होने पर स्वीकार नहीं की जाएंगी।

Received

Barkatullah Vishwavidyalaya , Bhopal [M.P.]

Session – Dec. 2020

College Name : - 117 , St. Mary's P.G. College , Vidisha [M.P.]

Student's Name : -

Father's Name : -

Mobile No.(Student) : -

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Medium :-

Name of Paper's : - (1)

(2)

(3)

(4)

(5)

Submit Date : -

Name of Receiver : -

Signature of Receiver : -

Exam.Time Table For M.Sc. {Chemistry}

S.N.	Class	Answer Sheet's Submit Date	Answer Sheet's Submit Time	Practical Record's Submit Date	Practical Record Submit Time
01.	M.Sc. Ist Sem.{Chem.}	11/02/2021 To 12/02/2021	10:30AM To 12:30PM	16/02/2021	10:30AM To 12:30PM
02.	M.Sc. IIIrd Sem.{Chem.}	18/02/2021 To 19/02/2021	10:30AM To 12:30PM	13/02/2021	10:30AM To 12:30PM