

B. L. D. E Association's
S.B Arts and K.C.P Science College – Vijayapura
P. G. Department of Chemistry
M. Sc. 3rd Semester First Internal Assessment Examination (Theory)
CHIT-3.1 Inorganic Chemistry

Max. Marks: 20

Time: 1 Hours

Date: 27/01/2023

Q. No.1 Answer any Two of the Following

[2X2=4]

- Calculate the total no. of micro-states for p^2 and d^7 configuration?
- Define term symbol and also find out the ground term for V^{3+} ion.
- Distinguish between Orgel and Tanabe- Sugano diagrams.

Q. No.2 Answer any Four of the Following

[4X4=16]

- Draw and discuss the generalized Orgel diagrams for d^2 , d^3 , d^7 and d^8 electronic configuration.
- Calculate the values of B' and β for $[V(H_2O)_6]^{3+}$ which exhibits absorption bands at 12300, 18500 and 27900 cm^{-1} (Given : B for free V^{2+} ion is 750 cm^{-1}). Assign these transitions and comment on M-L bonding.
- What is the color of $[Cu(H_2O)_6]^{2+}$ complex ion in water? Explain with the help of electronic spectrum. Why the two bands are seen in electronic spectrum of $[V(H_2O)_6]^{3+}$.
- Explain T. S diagram for d^6 system.
- State Hund's rule use to find the ground term states of a free metal ion. Find the ground terms for d^2 and d^9 system.

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CHIT-3.2 Organic Chemistry

Max. Marks: 20

Time: 1 Hours

Date: 28/01/2023

Q. No.1 Answer any Two of the Following **[2X2=4]**

- a. Define Pericyclic reactions and their classifications?
- b. Give an example for 1,3dipolar cycloaddition reactions and Diel-alder reaction.
- c. Give an example for retention and inversion of configuration.

Q. No.2 Answer any Four of the Following **[4X4=16]**

- a. Draw molecular orbital diagram for Allyl systems.
- b. Explain the term with an example (I) Supra and antra-facial (II) Con and Dis rotatory motions.
- c. Discuss Huckel-mobius method (PMO approach) with examples.
- d. Explain co-relation diagram for 4n system by taking an example.
- e. Define Ene and Claisen reaction with an example.

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P. G. Department of Chemistry
M. Sc. III Semester, First Internal Assessment Test (Theory),
CHPT-3.3: PHYSICAL CHEMISTRY-III

Max. Marks: 20

Time: 1 Hours

Date: 30/01/2023

PART-I: - Answer any TWO of the following questions.

2x2=4

1. Explain autocatalytic reaction with an example.
2. How do activators and inhibitors act on enzyme activity?
3. Define Michaelis-Menten constant and explain its significance.
4. Write the advantages of homogeneous catalysis.

PART-II: - Answer any FOUR of the following questions.

4X4=16

1. Discuss the pH effect on rate constant of catalyzed reactions.
2. Write a note on oscillatory reactions.
3. Discuss the unimolecular surface reactions.
4. Elaborate the different intermediate stages in homogeneous catalysis.
5. Explain the general and specific acid-base catalyzed reaction

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P. G. Department of Chemistry
M. Sc. III Semester, First Internal Assessment Test (Theory),
CHGT-3.4-Spectroscopy-III

Max. Marks: 20

Time: 1 Hours

Date: 31/01/2023

PART-I: - Answer any TWO of the following questions.

2x2=4

1. What are limitations of NQR spectroscopy?
2. Define isomer shift and recoil energy.
3. What is I value for a nuclei ^{35}Cl and ^{16}O .

PART-II: - Answer any FOUR of the following questions.

4X4=16

1. Discuss the instrumentation of NQR spectroscopy. Comment on its applications in determining nature of chemical bonding & structure by taking suitable examples.
2. Explain the parameter quadrupole interactions and magnetic interactions by taking suitable examples.
3. Draw & explain the Mossbauer spectra of $\text{K}_4\text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$ and FeCl_3 .
4. Write the principle of Mossbauer spectroscopy.
5. How do you distinguish Fe(II) & Fe(III) complexes by using Mossbauer spectrum.
6. How many NQR resonance lines you would expect for the following nuclei under the conditions indicated.

i) ^{14}N : $I=1$, $\eta=0$, $B_0=0$

ii) ^{127}I : $I=5/2$, $\eta=0$, $B_0=0$

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M. Sc. III Semester, Second Internal Assessment Test (Theory),
CHGT-3.4-Spectroscopy-III

Max. Marks: 20

Time: 1 Hours

Date:04/03/2023

PART-I: - Answer any TWO of the following questions.

2x2=4

1. Write the significance of spin and magnetic field in ESR.
2. Enumerate the effect of coordination on ligand bands in IR-spectrum.
3. Sketch the IR spectra of ammine and comment on its features upon co-ordination.

PART-II: - Answer any FOUR of the following questions.

4X4=16

1. Sketch the IR spectra of di and trinuclear carbonyl complexes.
2. Sketch the IR spectra of N,N-dimethylacetamide and comment on its features upon coordination.
3. Write a note on zero-field splitting & Kramer's degeneracy.
4. Explain the ESR spectra of methyl, benzoquinone and cyclopentadienyl radicals.
5. Discuss the changes in symmetry upon coordination of NO_3^- and NO_2^- .
6. Explain hyperfine structure of ESR absorption.

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Max. Marks: 20

Time: 1 Hours

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4X4=16

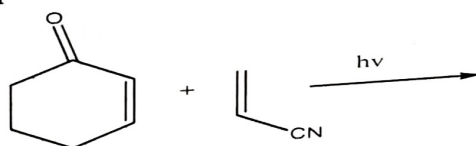
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M. Sc. III Semester, Second Internal Assessment Test (Theory),
CHOR-3.2-Organic Chemistry
Max. Marks: 40 Time: 2 Hours Date: 06/03/2023

4x2=08

PART-I:- Answer any FOUR of the following questions.

1. State the terms quantum efficiency and quantum yield.
2. Write the structure of DCC?
3. What are phase transfer catalysts? Give two examples.
4. What is Exciplex? Give an example.
5. Assign the product



PART-II:- Answer All the of the following questions.

- I.
 - a. Write the synthetic applications of Gilman reagent? (5+5+6)
 - b. Write a note on Woodward and Prevost hydroxylation reactions?
 - c. Describe the photochemical reactions of aromatic compounds

OR

 - d. What are singlet state & triplet states give appropriate explanation.
- II.
 - a. Write a note on Norrish type-I reaction with an example? (5+5+6)
 - b. Write brief note on Barton reaction?
 - c. Write note on DDQ with an example.

OR

 - d. Write a note on Paterno buchi reaction with an example.

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CHPT-3.3: PHYSICAL CHEMISTRY-III

Max. Marks: 40

Time: 2 Hours

Date: 07/03/2023

PART-I

2x4=8

I. Answer any **FOUR** of the following

1. Distinguish between intrinsic and extrinsic semiconductors.
2. Conductivity of a semiconductors increases with temperature. Explain.
3. What are p-n junctions? Write any two uses of p-n junction.
4. Give the meaning of doping of a crystal.
5. What is Meissner effect? Explain.
6. What is persistence current in superconductors?

PART-II

16x2=32

II. Answer the following

1.
 - a) Describe the p-type and n-type semiconductors.
 - b) Explain Fermi energy level in semiconductors.
 - c) Discuss the BCS theory of superconductivity.

OR

- d) Give an account of forward bias in p-n junction.
2.
 - a) Write a note on free carrier concentration in semiconductors.
 - b) Discuss about conventional superconductors.
 - c) Derive expression for London penetration depth.

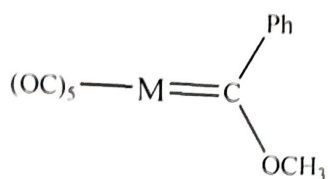
OR

- d) Discuss the thermodynamics of superconducting transition.

PART-I:- Answer any **FOUR** of the following questions.

4x2=8

1. Why tetrahedral complexes are generally more intense in color than tetrahedral complexes?
2. With the help of 18-electron rule, predict the suitable metal for



3. What is the difference between d-d and charge transfer transitions?
4. What is the ground term symbol for Ni^{2+} ?
5. Write the structure of Vaska's complex.

PART-II:- Answer the following questions.

1. (a) What are the possible mechanism to relax Laporte selection rule. 5
(b) Give a note on synthesis and bonding in Ferrocene. 5
(c) Describe the hydrogenation of alkene by Wilkinson's catalyst. 6
(or)
(d) Write a note on hydroformylation reaction.
2. (a) Write the Orgel diagram for d^4 octahedral system and mention its correlation systems. 5
(b) What are Oxidative addition and Reductive elimination- Give one example each. 5
(c) Explain the synthesis, structure and properties of Zeise's salt. 6
(or)
(d) Give a note on synthesis and bonding in metal-cyclopentadienyl system

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CHIT-4.1-Inorganic Chemistry
Max. Marks: 40 Time: 2 Hours Date: 20/09/2023

1. Answer any FOUR of the following questions.

2x4=08

- a) What are fuels? Give its complete classification.
- b) What is proximate and ultimate analysis of coal?
- c) Define Gross calorific value (GCV) and Net calorific value (NCV) of a fuel.
- d) Define the term knocking of petrol.
- e) Define the terms Flash point and Fire point.

2. a) Describe the procedure to determine calorific value of a liquid fuel using Bomb's Calorimeter. (5)

b) Explain the procedure to determination of Aniline point. (5)

c) Write the synthesis of TNT and RDX. (6)

OR

d) Explain the process of proximate analysis. (6)

3.a) What are silicone polymers? Write the properties and applications of silicone polymer. (5)

b) Explain the applications of Hydrides with relevance to hydrogen storage. (5)

c) Explain the synthesis of coal gas and water gas. (6)

OR

d) Explain the preparation and application of producer gas. (6)

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M. Sc. IVth Semester, Second Internal Assessment Test (Theory),
CHOR-4.2-Organic Chemistry
Max. Marks: 40 Time: 2 Hours Date: 21/09/2023

PART-A:- Answer any FOUR of the following questions. 4x2=08

1. Define Hudson's rule and anomeric effect?
2. List out difference between DNA and RNA?
3. Define configuration on monosaccharides with example.
4. List out Importance of glycosides?
5. List any two uses of cocaine and codeine

PART-B:- Answer All the of the following questions.

- I. a. Determine ring size of glucose? (5+5+6)**
b. Discuss the Structure of nucleotides.
c. Explain Edman and Sanger method for end group analysis.

OR

- d. Write a note different kind of Structures of starch?**

- II. a. Discuss classification of terpenoids? (5+5+6)**
b. Write note on Structural elucidation of Ephedrine?
c. Discuss Watson and crick model of DNA.

OR

- d. Discuss Synthesis of quinine.**

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CHPT-4.3-Physical Chemistry
Max. Marks: 40 Time: 2 Hours Date: 22/09/2023

PART – I

- I. Answer any **FOUR** of the following **2x4=8**
1. Define fugacity.
 2. List out the thermodynamic functions of ideal gas.
 3. Write the expression for entropy of ideal mixing.
 4. Write any two applications of nanoparticles in medical field.
 5. What is the principle of XRD in the analysis of nanoparticles.

PART-II

- II. Answer the following **16x2=32**

1. a) Derive the expression for Gibb's Duhem equation.
b) Derive the expression for chemical potential of pure ideal gas.
c) Derive the expression for Duhem-Margules equation.

OR

- d) Discuss the determination of partial molar properties by intercept method.
2. a) Explain laser ablation method for the synthesis of nanoparticles and write its advantages of the method.
b) Explain the characterization of nanoparticles by AFM method.
c) With neat labeled diagram list out the difference between nematic and smectic liquid crystals.

OR

- d) Derive the expression for activity coefficient of solution.

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M. Sc. IV Semester, First Internal Assessment Test (Theory),
CHGT-4.4-Spectroscopy-IV

Max. Marks: 20

Time: 1 Hours

Date: 23/09/2023

1. **Answer any TWO of the following questions.**
- a) Write the principle of Auger electron spectroscopy.
 - b) Define binding energy and core electrons.
 - c) Fluorescence and phosphorescence.

2x2=4

2. **Answer any FOUR of the following questions.**

4x4=16

- a) Give an account of photoionization process and chemical shift in photoelectron spectroscopy.
- b) Discuss a principle and instrumentation of X-ray photoelectron spectroscopy.
- c) Discuss the factors affecting on luminescence-quantum efficiency.
- d) Discuss photoelectron spectra of H₂ molecule and He atom.
- e) Sketch the Jablonski diagram for a photo-luminescent system and explain the various deactivation processes.

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P. G. Department of Chemistry
M. Sc. IV Semester, First Internal Assessment Test (Theory),
CHGT-4.4-Spectroscopy-IV

Max. Marks: 20

Time: 1 Hours

Date: 23/09/2023

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CHIT-4.1-Inorganic Chemistry
Max. Marks: 20 Time:1 Hours Date:24/07/2023

PART-I :- Answer any TWO of the following questions.

2x2=04

1. Define silicates and Zeolites
2. Give the structure of S_4N_4 and $S_4N_4H_4$
3. Give reactions of phosphazenes

PART-II :- Answer any FOUR of the following questions.

4X4=16

4. Write a note on clay minerals and zeolite
5. Explain different types of silicates
6. Discuss the structural aspects of hexachlorocyclotriphosphazene
7. Give the reactions of hexachlorocyclotriphosphazene and polyphosphazene
8. Explain synthesis, structure and reactivity of S_4N_4 , $S_4N_4H_4$ and $(SN)_x$

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Max. Marks: 20 Time:1 Hours Date:24/07/2023

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M. Sc. IV Semester I Internal Test (Theory),
CHOT-4.2 Organic Chemistry

Max. Marks: 20

Time: 1 Hour

Date: 25/07/2023

- 1) Answer any two of the following 2 × 2 = 4 marks
- a. What are the uses of acetylene in organic synthesis?
 - b. Define reversal of polarity with an example?
 - c. Give an example for FGI with explanation?
- 2) Answer any four of the following questions 4 × 4 = 16 marks
- a. Discuss Chemoselectivity and its solutions?
 - b. Explain Michael addition reaction with an example.
 - c. Discuss order of events in organic synthesis?
 - d. Explain protection and deprotection of hydroxyl group?
 - e. Explain the retrosynthesis of benzocaine?

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CHPT-4.3: PHYSICAL CHEMISTRY-III

Date: 26/07/2023

Max. Marks: 20

Time: 1 Hours

2x2=4

PART-I: - Answer any TWO of the following questions.

1. What are opposing reactions?
2. What are simultaneous reactions? Mention the types?
3. Define chain length and give the expression for it
4. What is inhibition reaction? Give example.

4X4=16

PART-II: - Answer any FOUR of the following questions.

1. Derive the rate expression for first order opposed by first order.
2. Derive the expression for time maximum concentration of intermediate.
3. Discuss the inhibition decomposition of C_2H_6 .
4. Discuss Rice Herzfeld mechanism with examples of CH_3CHO .
5. Explain the kinetics of free radical mechanism.

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CHGT-4.4-Spectroscopy-IV

Max. Marks: 20

Time: 1 Hours

Date: 27/07/2023

1. **Answer any TWO of the following questions.**

2x2=4

- a) Define cotton effect.
- b) Give the principle of flame emission spectroscopy.
- c) Define ORD.

2. **Answer any FOUR of the following questions.**

4x4=16

- a) Give an account for the application of ORD in determination of acid catalyzed mutarotation of glucose and inversion of cane sugar.
- b) Write a note on flame background, metallic spectra in flame
- c) Explain the octant rule with one example.
- d) Discuss principle and instrumentation of chiroptical spectroscopy.
- e) Discuss the interferences in flame photometry.

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Max. Marks: 20

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- b) Write a note on flame background, metallic spectra in flame
- c) Explain the octant rule with one example.
- d) Discuss principle and instrumentation of chiroptical spectroscopy.
- e) Discuss the interferences in flame photometry.