

M.Sc. DEGREE EXAMINATION, JANUARY- 2017

THIRD SEMESTER

Branch : CHEMISTRY

**CHE 301 - INORGANIC CHEMISTRY - III**

(Under Non - CBCS Revised Syllabus w.e.f. 2015-16)

(For Suppl. candidates who appeared in 2015 exam only)

Max. Marks : 80

Time : 3 Hours

Note : Answer **Four** questions, choosing **one** full question from each unit. Sub - divisions (a), (b) & (c) carries **4,6 and 10** marks respectively.

**Unit - I**

1. a) Give an account of iron - sulphur proteins. (4)
- b) Explain the role played by  $\text{Co}^{2+}$  in biological systems. (6)
- c) Discuss the functioning of metalloproteins in electron transfer process. (10)

**OR**

2. a) What is the significance of the fact that channels for  $\text{Na}^+$  transport are quite permeable to  $\text{n}^+$  whereas  $\text{K}^+$  channels are not? (4)
- b) Write a note on structural features of vitamin  $\text{B}_{12}$ . (6)
- c) Discuss the structural aspects of hemoglobin and its function in oxygen transport. (10)

**Unit - II**

3. a) Explain the basic principles of Mossbauer spectroscopy. (4)
- b) Explain the significance of isomer shift and "quadrupolar interaction" in Mossbauer spectroscopy. (6)
- c) Discuss the use of Mossbauer spectroscopy in the structure elucidation of  $\text{Fe}_3(\text{CO})_{12}$ . (10)

**OR**

4. a) How does NQR spectroscopy help in the study of phase transitions of compounds. (4)

- b)  $\text{TeCl}_4$  exhibits six resonance of equal intensity whereas  $\text{TeCl}_3^+ \text{AlCl}_4^-$  shows seven resonances of the same intensity. Why? Explain. (6)
- c) Obtain the energies of NQR transitions for a nucleus of spin  $7/2$  in an axially symmetric field. (10)

### Unit - III

5. a) Comment on the significance of "g - value" in ESR spectroscopy. (4)
- b) Plot the ESR spectrum of methyl radical. What is the influence of the replacement of  $^{12}\text{C}$  by  $^{13}\text{C}$  in the radical on the spectrum. (6)
- c) With suitable energy level diagrams, sketch and explain the ESR spectra of
- i)  $[\text{M}(\text{OX}_2)_6]^{2+}$  (M has  $I = 3/2$  and has d3 electron configuration in the complex)
- ii)  $[\text{Mn}(\text{OX}_2)_6]^{2+}$  (Mn has  $I = 5/2$ ). (10)

### OR

6. a) Citing an example, explain the term spin polarization. (4)
- b) Explain the mechanism for the origin of fine structure in "triplet states" and in "transition metal ions". (6)
- c) Explain the relaxation process and line width in ESR transitions. (10)

### Unit - IV

7. a) What is Anger process? What information can be obtained from an Anger spectrum? (4)
- b) Give the theory and principles of photoelectron spectroscopy. (6)
- c) Discuss the photoelectron spectra of  $\text{O}_2$  and  $\text{N}_2$  molecular. (10)

### OR

8. a) Describe the process of photoionization from core and valence levels. (4)
- b) The photo - ionization of  $\text{F}_2$  by  $\text{He(I)}$  produces  $\text{F}_2^+$ . Explain why the intensity of  $I' = 0 \rightarrow 2$  transition is stronger than that of  $0 \rightarrow 0$  transition. (6)
- c) With a schematic energy level diagram, distinguish between X-ray fluorescence and Anger process. Describe the salient features of anger spectrum of S in  $\text{Na}_2\text{S}_2\text{O}_3$ . (10)



M.Sc. DEGREE EXAMINATION, JANUARY - 2017

THIRD SEMESTER

Branch : CHEMISTRY

Paper - I : INORGANIC CHEMISTRY - III

(W.e.f. 2016-2017)

(Common for both the Campus Students with 70 marks & Affiliated College Students with 80 marks)

(Common to suppl. candidates for Campus Students also i.e. who appeared in 2015 only)

Time : 3 Hours

Max. Marks : 70/80

**SECTION - A**

Answer any **Four** questions. All questions carry **equal** marks.

(5×4=20)

1. Write a note on hemerythrin
2. Write the general functions of metalloproteins
3. Explain chemical shift in Mossbauer Spectroscopy
4. Write about the criteria for the selection of nuclei in Nuclear Quadrupole Resonance Spectroscopy (NQR)
5. Explain Hyperfine splitting in Electron Spin Resonance spectroscopy (ESR)
6. Write the biological applications of ESR spectroscopy
7. State and explain Koopman's theorem
8. How Auger electron spectroscopy can be used as a finger print tool?

**SECTION-B**

Answer **all** questions. Choosing one question from each Unit. (4×15=60) / (4×12½=50)

**Unit - I**

9. a) Explain the model synthetic complexes of copper complexes

**OR**

- b) Discuss the structure and functions of metalloproteins in electron Transfer processes.



## Unit - II

10. a) Explain the Theory and principle of Mossbauer spectroscopy. Write its applications in the study of bonding.

OR

- b) Describe the theory and principle of NQR spectroscopy. Write its applications

## Unit - III

11. a) Write the working principle of Electron Spin Resonance (ESR) spectroscopy. How ESR is useful for the study of inorganic free radicals giving suitable examples

OR

- b) What is 'g' value? Explain the factors affecting 'g' value in ESR studies. Write the applications of ESR in the study of Iron - Sulphur proteins

## Unit - IV

12. a) Explain the principle of ultra violet photo electron spectroscopy. Write its applications in the study of molecular orbitals of  $O_2$  molecule.

OR

- b) Write about the sources of radiation and detectors used in Photoelectron spectrophotometer. Explain the Instrumentation with a diagram





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M.Sc. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER - 2017

THIRD SEMESTER (CBCS & NON CBCS)

Branch : CHEMISTRY

**Paper II : ORGANIC CHEMISTRY - III**

(W.e.f 2016-17)

*(Common for both the campus students with 70 marks & Affiliated college students with 80 marks)*

*(Common to Supplementary. Candidates for Campus Students also i.e. who appeared in 2015)*

Time : 3 Hours

Max. Marks :70/80

**Section - A**

**Answer any Four questions. All questions carry equal marks.**

**(4×5=20)**

1. Write the preparation and synthetic uses of Anhydrous  $\text{AlCl}_3$
2. Explain the use of DCC with suitable examples.
3. Explain the use of Organo Copper reagents with suitable examples.
4. Write a note on homogeneous catalytic hydrogenation
5. Explain the use of chiral auxiliaries with suitable examples.
6. Describe Sharpless epoxidation with an example.
7. Write a note on Bayer-Villiger oxidation.
8. Explain the use of enzymatic reduction with a suitable example.

**Section - B**

**Answer all questions. All questions carry equal marks.**

$$(4 \times 12\frac{1}{2} = 50 / 4 \times 15 = 60)$$

9. a) Describe the use of Merrifield Resin and DDQ in Organic Synthesis with suitable examples.

**(Or)**

- b) Describe the use of Ziegler-Natta catalysts and Boron trifluoride in Organic Synthesis with suitable examples.

10. a) Describe the synthesis and applications of Grignard reagents.

**(Or)**

- b) Describe the synthesis and applications of Organo Rhodium reagents.

11. a) Describe diastereoselectivity and enantioselectivity with suitable examples.

**(Or)**

- b) Describe the use of LAH and borate reagents.

12. a) Describe the use of Chromium trioxide and Selenium dioxide with suitable examples.

**(Or)**

- b) Describe the use of Sodium Borohydride and Boron Aluminium Hydride with suitable examples.

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M.Sc. DEGREE EXAMINATION, JANUARY- 2017

THIRD SEMESTER

Branch : CHEMISTRY

**CHE 302 - ORGANIC CHEMISTRY - III***(Under Non - CBCS Revised Syllabus w.e.f. 2015-2016)**(For Suppl. candidates who appeared in 2015 exam only)*

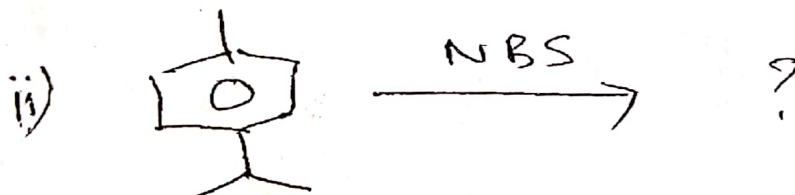
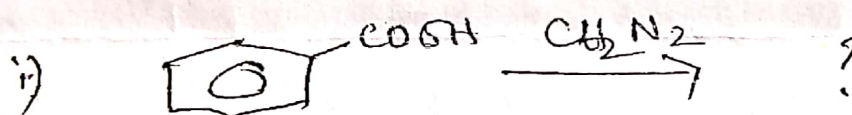
Time : 3 Hours

Max. Marks : 80

Note : Answer **Four** questions, choosing **one** full question from each unit. Sub - divisions (a), (b) & (c) carries **4, 6 and 10** marks respectively.

Unit - I **LA**

1. a) Give an account of use of lead tetra acetate in organic synthesis. (4)  
b) Predict the production and propose mechanisms. (6)



- c) Write briefly on the application of the following in organic synthesis.

i) Ziegler - Natta catalysts

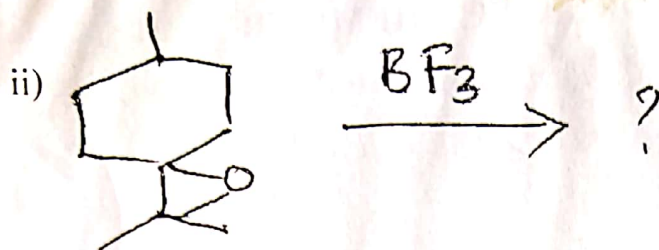
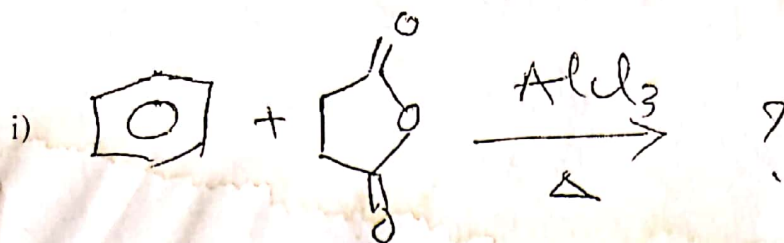
ii) Merrifield Resin.

(10)

OR

2. a) Discuss the application of DDQ in organic synthesis. (4)  
b) Give the products and mechanisms. (6)





c) Give a short account of the following in organic synthesis.

i) Dicyclohexylcarbodiimide

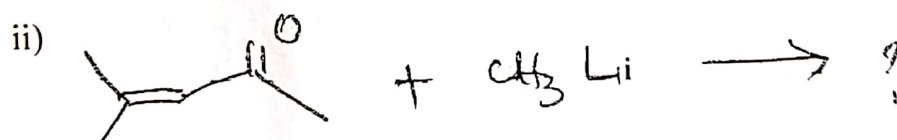
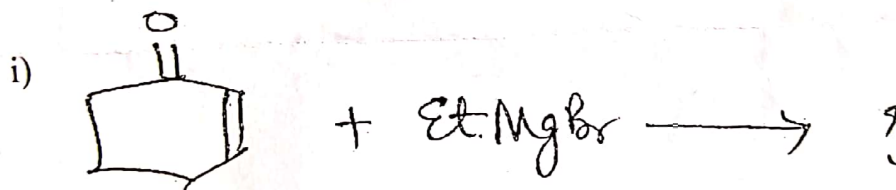
ii) Dithianes.

(10)

## Unit - II

3. a) With suitable examples give the application of dialkyl zinc in organic synthesis. (4)

b) Predict the products and propose mechanisms. (6)



c) Write short notes on Use of the following in organic synthesis.

i) Rhodium salts

ii) Copper metal & its compounds.

(10)

OR

4. a) What is the use of mercury compounds in organic synthesis? Explain with suitable examples. (4)

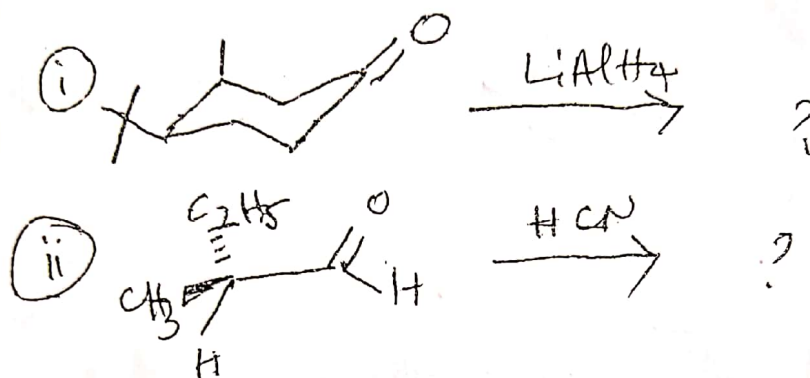
b) With suitable examples give mechanisms of

(2)

- i) Clemmensen reduction (6)
- ii) Ullmann reaction. (6)
- c) Give an account of the following in organic synthesis :
  - i) Hydroformylation (10)
  - ii) Homogeneous catalytic hydrogenation. (10)

### Unit - III

5. a) With suitable examples, give the endo or exo - selectivity in the stereo selective. Diels - Alder reactions. (4)
- b) Predict the major products and propose mechanisms for their formation (6)



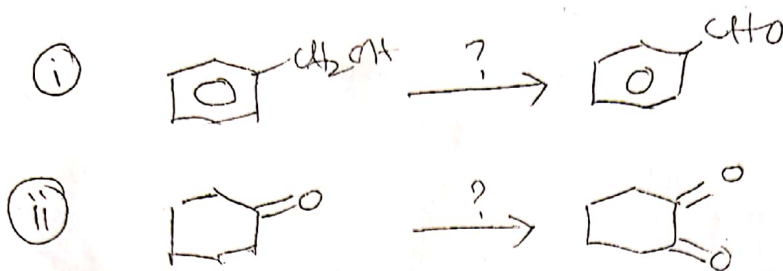
- c) Give an account of the following
  - i) Prochirality
  - ii) Stereo selective aldol condensation. (10)

OR

6. a) Write a note on use of borate reagents in asymmetric reduction reactions. (4)
- b) What are euantio selective and diastereoselective reactions? Explain with suitable examples. (6)
- c) Give a detailed account of the following with suitable mechanisms.
  - i) Alkylation of chiral imines
  - ii) Sharpless epoxidation. (10)

# Unit - IV

7. a) Suggest suitable reagents and mechanism for the following conversions. (4)



- b) Write briefly on use of the following in organic synthesis.

- i) Oppenauer oxidation ✓  
ii) Prevost reaction. ✓

(6)

- c) Give a detailed account of

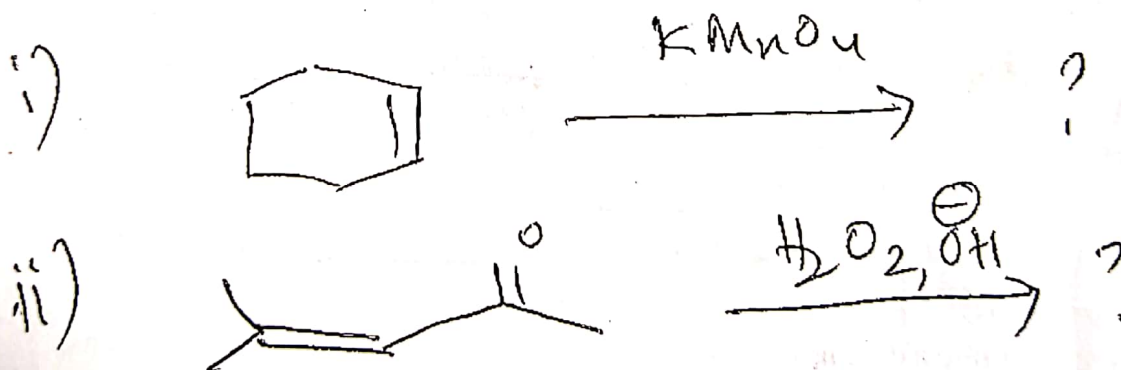
- i) Enzymatic and microbial reduction  
ii) Bayer - Villiger oxidation.

(10)

OR

8. a) Describe the application of DMSO as an oxidizing agent in organic synthesis. (4)

- b) Predict the products and propose mechanisms. (6)



- c) Write a note on :

- i) Dissolving metal reductions  
ii) Oxidative cleavage of alkenes by transition metal reagents.

(10)



(4)



M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018.  
THIRD SEMESTER

Branch — Chemistry

CHE 302 — ORGANIC CHEMISTRY — III  
(Under CBCS Revised Syllabus w.e.f. 2015-16)

Max. Marks : 70/80

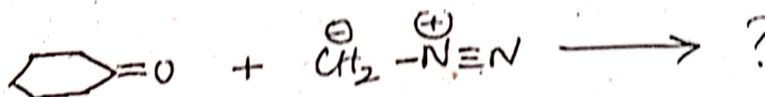
Time : 3 hours

SECTION - A

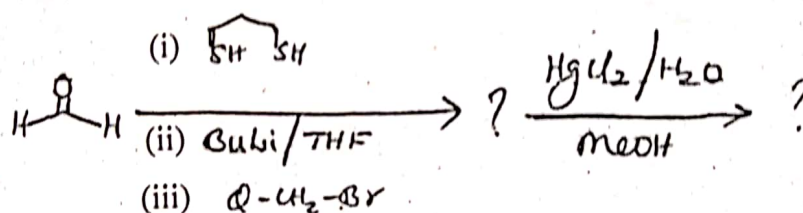
Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

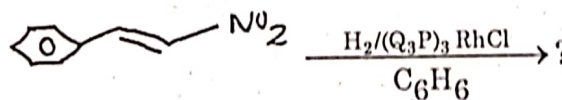
1. Formulate the product and suggest a suitable mechanism



2. Guess the products and write mechanism.



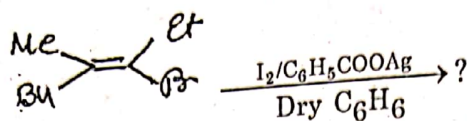
3. What is solvomercuration reaction? Explain with appropriate examples.  
4. Sketch the product and give mechanism.



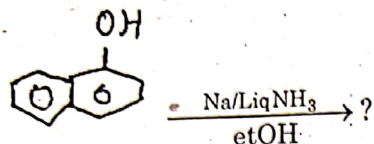
5. Discuss Chiral enolates.  
6. Describe asymmetric reduction using Borate reagents.

[P.T.O.]

7. Predict the product and propose a proper mechanism.



8. Identify the product and furnish the mechanism.



### SECTION - B

Answer ALL questions. Each question carries  $12\frac{1}{2}$  marks.

(Marks :  $4 \times 12\frac{1}{2} = 50/4 \times 15 = 60$ )

9. (a) Write a short note on use of the following reagents in organic synthesis.  $(4\frac{1}{2} + 4 + 4 = 12\frac{1}{2})$

- Lead tetra acetate
- N-Bromosuccinimide.
- Dicyclohexyl carbodiimide

Or

- (b) Give a short note on use of the following reagents in organic synthesis.  $(4\frac{1}{2} + 4 + 4 = 12\frac{1}{2})$

- $\text{AlCl}_3$
- DDQ
- Merrifield resin.

10. (a) Discuss a brief account on synthesis and application of the following organo metallic reagents.  $(4\frac{1}{2} + 4 + 4 = 12\frac{1}{2})$

- Grignard reagent
- Organo zinc reagent
- Organo lithium reagent.

Or

- (b) Give a brief account on synthesis and application of the following organometallic reagents.  $(4\frac{1}{2} + 4 + 4 = 12\frac{1}{2})$

- Organo palladium compound
- Organo rhodium compound
- Hydro formylation reaction.

11. (a) (i) Compare and contrast diastereo selectivity and enantio selectivity.  
(ii) Explain Sharpless epoxidation with suitable examples.  $(6\frac{1}{2} + 6 = 12\frac{1}{2})$

Or

$(6\frac{1}{2} + 6 = 12\frac{1}{2})$

- (b) Describe a brief account on :

- (i) Stereo selective Diels-Alder reaction.  
(ii) Asymmetric reduction using Lithium aluminium hydride.

12. (a) (i) Describe dimethyl sulfoxide oxidation.  $(4\frac{1}{2} + 4 + 4 = 12\frac{1}{2})$   
(ii) Discuss  $\text{MnO}_2$  oxidation.  
(iii) Illustrate  $\text{NaBH}_4$  reduction.

Or

- (b) (i) Describe  $\text{LiAlH}_4$  reduction.  
(ii) Discuss enzymatic reduction.  
(iii) Illustrate  $\text{OsO}_4$  oxidation.



M.Sc. DEGREE EXAMINATION, JANUARY - 2017

THIRD SEMESTER

Branch : CHEMISTRY

Paper II : ORGANIC CHEMISTRY-III

(W.e.f. 2016-2017)

(Common for both the Campus Students with 70 marks & Affiliated College Students with 80 Marks)

(Common to Supply. Candidates for Campus Students also i.e. who appeared in 2015 only)

Time : 3 Hours

Max. Marks : 70/80

**SECTION - A**

Answer any **Four** questions. All questions carry **equal** marks.

(4×5=20)

1. Write the preparation and synthetic uses of Diazomethane
2. Explain the use of Merrifield resin with suitable examples
3. Explain the use of Organo Zinc reagents with suitable examples
4. Write a note on homogeneous catalytic hydrogenation
5. Write a note on Stereoselective Diels-Alder reaction
6. Describe Sharpless epoxidation with an example
7. Write a note on Oppenauer oxidation
8. Explain the use of microbial reduction with a suitable example.

**SECTION - B**

Answer **All** questions. All questions carry **equal** marks.

(4×12½=50/4×15=60)

9. a) Describe the use of NBS and DDQ in Organic Synthesis with suitable examples

**OR**

- b) Describe the use of Ziegler-Natta catalysts and Lead Tetraacetate in Organic Synthesis with suitable examples

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(1)

[P.T.O.]

10. a) Describe the synthesis and applications of Grignard reagents

OR

b) Describe the synthesis and applications of Organo Palladium reagents

11. a) Describe diastereoselectivity and enantioselectivity with suitable examples

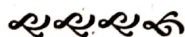
OR

b) Describe the use of LAH and borate reagents

12. a) Describe the use of Manganese dioxide and Osmium tetroxide with suitable examples.

OR

b) Describe the use of Sodium Borohydride and Boron Aluminium Hydride with suitable examples.



M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER, 2018.

THIRD SEMESTER

CHE OC - 301 : Branch : ORGANIC CHEMISTRY

Paper I — ORGANIC CHEMISTRY - III

(w.e.f. 2017-18 for Compus Students and Affiliated College Students)

Time : 3 hours

Max. Marks : 80

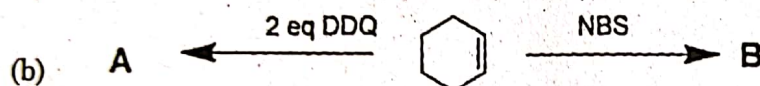
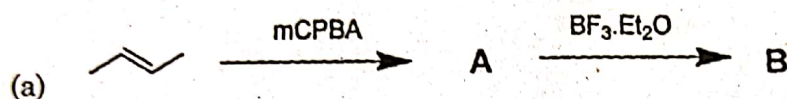
## SECTION - A

Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

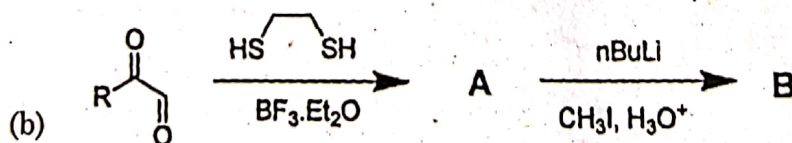
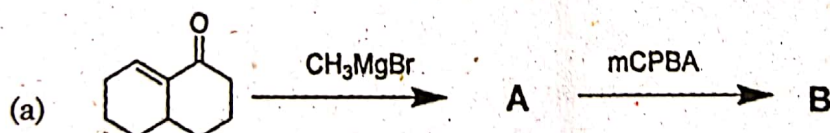
1. Mention few synthetic applications of Lead tetra acetate.

2. What are A and B in the following reactions?



3. What is Gilman's reagent? Explain with two suitable examples.

4. What are A and B in the following reactions.



5. Define enantioselectivity and give two examples.

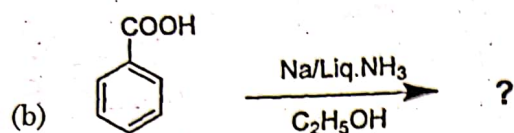
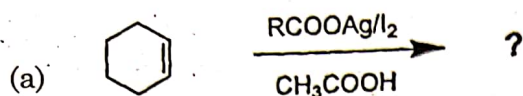
6. Give a brief note on chiral enolates.

7. Explain cleavage of alkenes by transition metals with examples.

[P.T.O.]



8. Predict the products with plausible mechanisms for the following reactions.



### SECTION - B

Answer ALL questions. All question carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) Explain the following with examples and mechanisms.

- (i) Friedal crafts acylation
- (ii) Fries rearrangement
- (iii) Zieglars-Natta catalyst

Or

(b) Give the applications with plausible mechanisms for each of the following

- (i) Diazomethane
- (ii) Dithiane
- (iii) Merrifields resin

10. (a) Explain the following with suitable examples

- (i) Negishi Coupling.
- (ii) Suzuki-Miyaura reaction.

Or

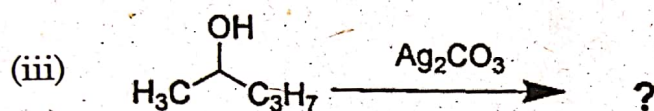
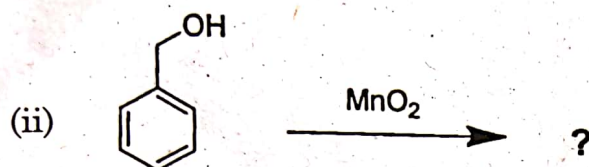
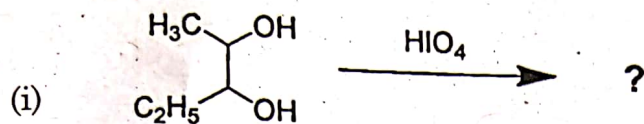
(b) What are organolithium reagents? Explain their applications in organic synthesis.

11. (a) Write in detail about stereoselective Diels-Alder reaction.

Or

(b) Explain Sharpless asymmetric epoxidation with plausible reaction mechanism.

12. (a) Explain the products formation with mechanism for the following reactions



Or

(b) Write about enzymatic and microbial reductions.

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M.Sc. DEGREE EXAMINATION —NOVEMBER/DECEMBER, 2019.

THIRD SEMESTER

Branch — Organic Chemistry

CHE : OC : 301 : Paper I — ORGANIC CHEMISTRY – III

(Revised Syllabus w.e.f. 2017-2018 for campus students and Affiliated college students)

Max. Marks : 80

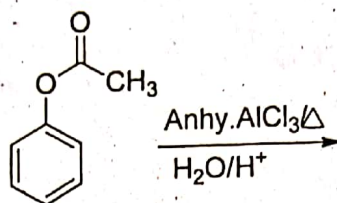
Time : 3 hours

## SECTION – A

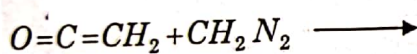
Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

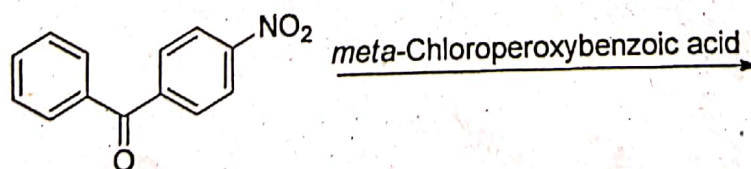
1. Give the product(s) formed in the following reaction with proper mechanism



2. Write the product and suggest the mechanism of the following reaction.



3. Write a short note on Lithium dialkylcuprates.
4. Explain the role of organomercury reagents in organic synthesis.
5. What are chiral Auxiliaries? Explain with suitable examples.
6. Write a short note on Sharpless epoxidation.
7. Write the product and suggest the mechanism of the following reaction.



8. Explain the importance of Red-Aluminium in organic synthesis.

[P.T.O.]

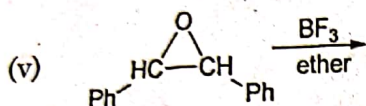
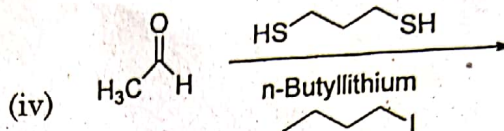
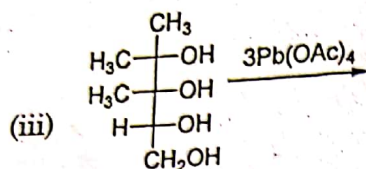
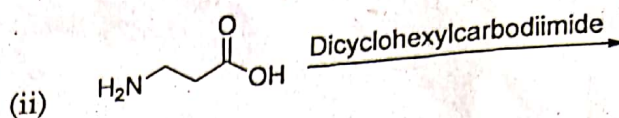
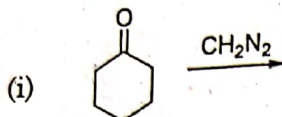


## SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) Write the product and suggest the suitable mechanism of the following reactions. (3+3+3+3+3)



Or

- (b) Explain the importance of following reagents in organic synthesis. (5+5+5)

(i) DDQ

(ii) Merrifield resin

(iii) Ziegler-Natta catalyst.

10. (a) (i) Discuss the utility of organolithium reagents in organic synthesis. (8+7)

(ii) What are the differences between homogeneous and heterogeneous catalytic hydrogenation? Explain with examples.

Or

- (b) (i) Explain the role of organorhodium reagents in organic synthesis. (6+9)

(ii) Discuss the importance of organopalladium reagents in organic synthesis.

11. (a) Write a note on: (5+5+5)

(i) Asymmetric Diels-Alder reaction

(ii) Diastereoselectivity

(iii) Asymmetric reduction.

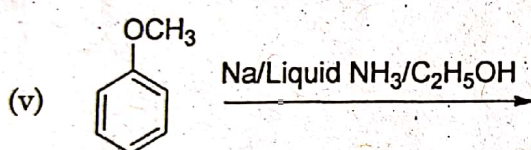
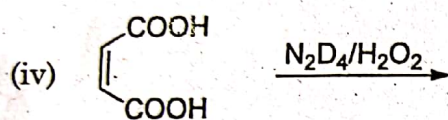
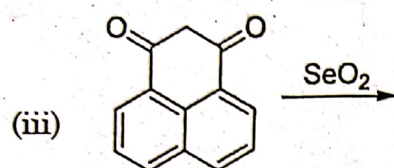
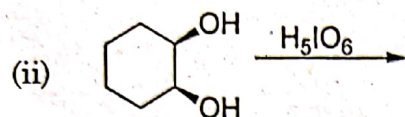
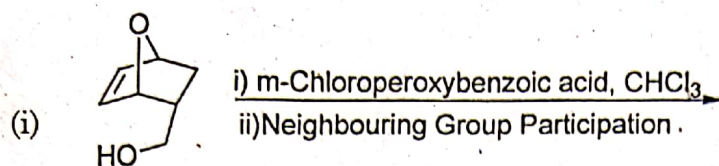
Or

- (b) (i) Discuss the substrate controlled methods in asymmetric synthesis with examples. (6+9)

(ii) Give an account on enantiomeric excess and diastereomeric excess.



12. (a) Predict the product and suggest the suitable mechanism of the following reactions.  
(3+3+3+3+3)



Or

- (b) (i) Write the mechanism and stereochemistry of oxidation of alkenes with Osmium tetroxide. (7+8)  
(ii) Give the mechanism of reduction of a ketone with  $\text{LiAlH}_4$ . Explain why  $\text{LiAlH}_4$  cannot reduce the isolated  $\text{C}=\text{C}$  and  $\text{C}\equiv\text{C}$  bonds.

M.Sc. DEGREE EXAMINATION, JANUARY - 2015  
THIRD SEMESTER

Branch III(C) - Chemistry

**CHE 304 : ORGANIC SPECTROSCOPY AND ITS APPLICATIONS**  
( Under CBCS Revised Syllabus w.e.f. 2010 -2011)

Max. Marks : 70

Time : 3 Hours

**Section - A**

Answer any **FOUR** of the following questions. All questions carry equal Marks.

(Marks: 4×5=20)

1. Discuss the Fieser - Wood Ward rules for Carbonyl Compounds
2. Write a note on positive and negative cotton effect with an example
3. Explain the concepts overtones and fermi resonance.
4. Write the vibrational frequencies of acids and esters with an example.
5. Write a note on nuclear over hauser effect.
6. Describe shielding and deshielding concepts with an example.
7. Discuss about Mc lafferty rearrangement with an example.
8. Write the fragmentation of Benzaldehyde

**Section - B**

Answer FOUR questions, choosing ONE from each unit.

ALL questions carry equal marks.

(Marks: 4×12 ½ = 50)

**Unit - I**

9. a) State Octant rule ? Illustrate the use of ORD in establishing the configuration of simple keto compounds

OR

- b) Explain the following

UV bands of saturated and Un-Saturated carbonyl compounds

ii) Write a note on Steric effect in biphenyl

206-03-04 R

(1)

[P.T.O.]

206-03-04 R

206-03-04 R

206-03-04

206-03-04 R

206-03-04

206-03-04

206-03-04



## Unit - II

10. a) Discuss the factors effecting on vibrational frequencies.

OR

- b) Explain the following

- i) Hydrogen bonding effect
- ii) FT-IR

## Unit - III

11. a) An Organic compound A (M.F.  $C_5H_{10}O$ ) exhibits the following spectral data:

$UV \lambda_{max} : 280nm$

$IR = 1715cm^{-1}$

$^1H NMR = \delta 0.90(3H, t); 1.60(2H, m),$

$2.20(3H, s), 2.40(2H, t)$

$Mass(m/z) = 86, 71, 58, 43(100\%)$

Deduce the structure of the compound A.

OR

- b) Explain the following

- i) FT - NMR
- ii) COSY

## Unit - IV

12. a) Explain the following
- i) High Resolution mass spectrometry
  - ii) Factors effecting fragmentation

OR

- b) Write a note on

- i) Molecular ion peak
- ii) Metastable peak

M.Sc. DEGREE EXAMINATION, JANUARY - 2017

THIRD SEMESTER

Branch : CHEMISTRY

Paper IV : ORGANIC SPECTROSCOPY AND ITS APPLICATIONS

(W.e.f. 2016-2017)

(Common for both the Campus Students with 70 marks & Affiliated College Students with 80 Marks)

(Common to Suppl. Candidates for Campus Students also i.e. who appeared in 2015)

Time : 3 Hours

Max. Marks : 70/80

SECTION - A

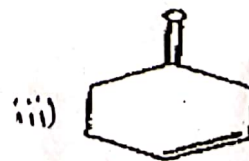
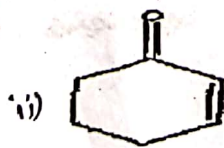
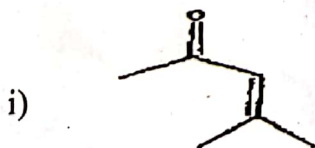
Answer any Four questions. All questions carry equal marks. (4×5=20)

1. Explain the UV spectra of a monosubstituted aromatic compound with a diagram
2. Write a note on steric effect in biphenyls
3. Write a note on Overtones in IR
4. Write a note on Fermi resonance
5. Explain anisotropy with an example
6. Describe Nuclear Overhauser Effect (NOE) with a suitable example
7. Explain the difference between EI and CI in mass spectroscopy with suitable examples
8. Write a note on Nitrogen rule

SECTION - B

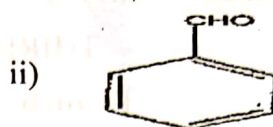
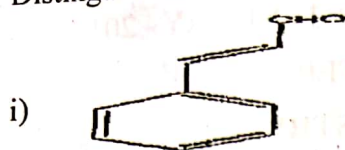
Answer all questions. All questions carry equal marks. (4×12½=50/4×15=60)

9. a). Distinguish the following compounds using Fischer-Woodward rules



OR

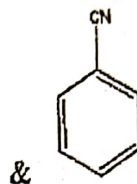
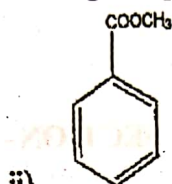
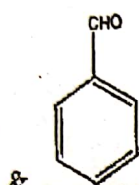
- b) Distinguish the following compounds using Fischer-Woodward rules



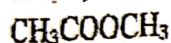
10. a) Write a note on hydrogen bonding in IR and explain the IR frequencies for OH (Primary, secondary, and tertiary), Carbonyl (conjugated and unconjugated), and ester functional groups.

OR

- b) How do you distinguish the following compounds using IR



iii)  $\text{CH}_3\text{COCH}_3$  and



11. a) Define Chemical Shift and describe various factors affecting the chemical shifts with examples.

OR

- b) Predict the  $^1\text{H}$ NMR and  $^{13}\text{C}$ NMR chemical shifts for the following compounds.

i) Ethyl benzoate

ii)  $\text{CH}_3\text{COCH}_2\text{COOCH}_2\text{CH}_3$

12. a) Write a note on each of the following.

i) Molecular ion peak

ii) Metastable peak

iii) Mc Lafferty rearrangement

iv) FAB

OR

- b) Predict the mass spectral fragmentation for the following compounds

i) 4-Chloro benzoic acid

ii) 4-Bromo benzoic acid

iii) 2-acetoxy-benzoic acid (Salicylic acid)





M.Sc. DEGREE EXAMINATION, DECEMBER - 2014

THIRD SEMESTER

Branch III (C) - CHEMISTRY

CHE 302: ORGANIC SPECTROSCOPY AND ITS APPLICATIONS - III

(Under Non-CBCS Revised Syllabus w.e.f. 2010-11)

Time : 3 Hours

Max. Marks : 80

Answer any Four questions, Choosing one question from each unit.

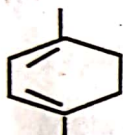
Sub-divisions (a), (b) and (c) carries 4, 6 and 10 marks respectively

## Unit - I

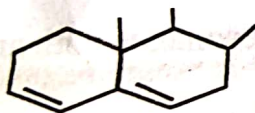
a) Calculate the  $\lambda_{\max}$  values of the following

(4)

i)



ii)



b) Explain various electronic transitions in UV

(6)

c) i) Discuss the positive and negative cotton effects with an examples

ii) Write a note on hydrogen bonding effect on vibrational frequency

(10)

OR

a) Write a note on solvent effect on electronic transitions

(4)

b) Explain combination bands and Fermi - resonance

(6)

c) i) Write a absolute configuration of cyclohexanones

ii) Describe an FT-IR

(10)

## Unit - II

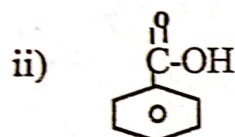
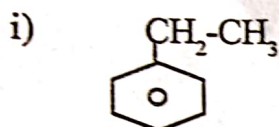
3. a) Write a note on advantages of FT-NMR (4)  
b) Explain shielding and deshielding concepts with examples (6)  
c) Explain factor's influencing on chemical shift (10)

OR

4. a) Write a note on chemical shift (4)  
b) Explain the terms nuclear spin and nuclear resonance with examples (6)  
c) Describe ABX and ABC spectral with suitable examples (10)

## Unit - III

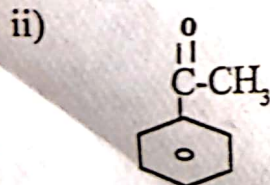
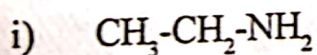
5. a) Predict the proton-chemical shift of the following (4)



- b) Write a note on chemical exchange and double resonance with an example (6)  
c) Explain the following (10)  
i) NOE Effect  
ii) COSY

OR

6. a) Predict the proton-chemical shift of the following (4)





- b) Explain the following
- Karplus equation curve
  - DEPT
- (6)
- c) An organic compound A [M.F  $C_9H_{10}O_2$ ] exhibits the following spectral data.
- IR:  $1745\text{cm}^{-1}$ (s),  $1225\text{cm}^{-1}$ (br,s),  $749\text{cm}^{-1}$ (s);  $697\text{cm}^{-1}$ (s)
- UV:  $\lambda_{\text{max}}$  at 268, 264, 262, 257 nm
- $^1\text{H NMR}$ :  $\delta$  1.96(3H, s); 5.00(2H, s); 7.22(5H, s)
- Deduce the structure of the compound
- (10)

#### Unit-IV

7. a) Write a note on Mc.lafferty rearrangement (4)
- b) Discuss the fragmentation pattern of n-pentane and benzoic acid (6)
- c) Explain the following
- Type of ionization
  - Metastable ion
- (10)

OR

8. a) Write a note on ion abundance (4)
- b) Discuss the fragmentation pattern of the following
- Toulene
  - Cyclohexene
- (6)
- c) i) How do you differentiate  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohals by using mats spectroscopy (10)
- ii) Expain isotopic abundance



M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018.

THIRD SEMESTER

Branch — Organic Chemistry

CHEOC-302 Paper II — ORGANIC SPECTROSCOPY AND APPLICATIONS

(Revised syllabus w.e.f. 2017-18 for Campus Students and Affiliated College Students)

Time : 3 hours

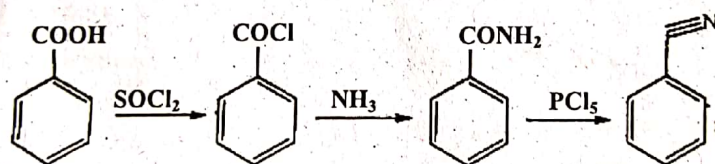
Max. Marks : 80

## SECTION - A

Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

1. Write a short note on electronic transitions.
2. Write a short note on wavelengths of conjugated polyenes.
3. Predict the changes of the IR bands for the functional groups in the following sequence of reactions.



4. Write a short note on Fermi resonance.
5. Explain the  $\alpha$ -,  $\beta$ - and  $\gamma$ -effect in  $^{13}\text{C}$  NMR spectroscopy.
6. Illustrate diagrammatically the AX, AB, ABC and  $A_2B_2$  spectra.
7. Explain in detail the factors affecting fragmentation in mass spectroscopy.
8. Sketch the mass spectral profiles of molecular ion peaks in organic compounds which possess one, two, three bromine atoms, respectively.

[P.T.O.]

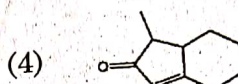
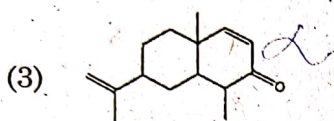
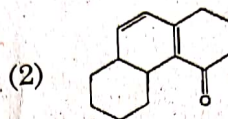
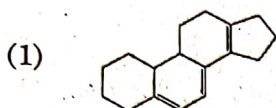


## SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) (i) Discuss the steric effect in biphenyls.  
 (ii) Basing on Woodward-Fischer rules, predict the  $\lambda_{\max}$  for the following compounds. (7 + 8)



Or

- (b) (i) Explain the effect of solvent on electronic transitions.  
 (ii) Mention Woodward-Fischer rule for calculating absorption maximum in carbonyl compounds. (5 + 10)

10. (a) Explain basic theory of IR spectroscopy. Draw the block diagram of IR spectrophotometer and explain the components.

Or

- (b) (i) How would you distinguish the following compounds by IR spectroscopy? (5 + 10)

- (1) propanaldehyde and acetone
- (2) ethanol and dimethyl ether
- (3) 1, 3-butadiene and 2-butyne

- (ii) Explain in detail about factors influencing the vibrational frequencies in IR spectroscopy.

11. (a) Explain how the  $^1\text{H}$  NMR is useful in determining the

- (i) E- and Z-isomers
- (ii) hydrogen bonding
- (iii) conformation of cyclohexane. (3 × 5)

Or

- (b) Discuss on

- (i) NOE
- (ii) Contact shift reagents
- (iii) Anisotropy. (3 × 5)



12. (a) Write note on :
- (i) Mc Lafferty rearrangement
  - (ii) Ci
  - (iii) Fragmentation in carboxylic acids.

Or

- (b) Explain the principle involved in Mass Spectrometry. Sketch the double focusing mass spectrophotometer and explain its components and their functions.
-



M.Sc. DEGREE EXAMINATIONS — NOVEMBER/DECEMBER 2019

THIRD SEMESTER

Branch : Organic Chemistry

Generic Elective

**CHE-OC-305 : Paper III(A) — INORGANIC SPECTROSCOPY AND THERMAL METHODS OF ANALYSIS**

*(Revised Syllabus w.e.f. 2017-2018 for Campus Students and Affiliated College Students)*

Time : 3 hours

Max. Marks : 80

**SECTION - A**

Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

1. Explain the TGA analysis of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .
2. Briefly discuss differences between TGA and DTA.
3. Explain the terms Doppler shift and Chemical shift associated with Mossbauer spectroscopy.
4. Discuss the principle of NQR spectroscopy. Explain the term quadrupole moments.
5. What are isotropic and anisotropic hyperfine splitting?
6. Explain the significance of relaxation process and line widths involved in ESR spectroscopy.
7. What is Koopman's theorem? Explain its limitations.
8. Explain the principle of Auger spectra.

**SECTION - B**

Answer ALL questions. All questions carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) Explain the principle of DTA. Elaborate DTA applications with special reference to the clays and minerals.

Or

- (b) With a neat sketch provide instrumentation of TGA. Explain how  $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  is analysed by TGA.

[P.T.O.]

10. (a) Give the principle of Mossbauer spectroscopy. Explain bonding structures of  $\text{Sn}^{2+}$  and  $\text{Sn}^{4+}$  compounds.

Or

- (b) Discuss in detail the principle and applications of NQR spectroscopy.
11. (a) With a neat sketch give the instrumentation of ESR spectroscopy. Explain the ESR spectrum of bis(salicylidimine) – Copper (II) complex.

Or

- (b) Discuss in detail the biological applications of ESR spectroscopy with a particular reference to free radical analysis.
12. (a) With a neat sketch explain the principle of XPS. Explain with relevant examples applications of Electron Spectroscopy of Chemical Analysis (ESCA).

Or

- (b) Discuss in detail how Auger spectra is used as a finger print tool. Explain Auger spectra application to surface studies.
-



M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER, 2018.

THIRD SEMESTER

Branch : Organic Chemistry

(Generic Elective)

## CHE OC - 305: Paper - III A: INORGANIC SPECTROSCOPY AND THERMAL METHODS OF ANALYSIS

(Revised syllabus w.e.f. 2017-2018 for Campus students and Affiliated College Students)

Time : 3 hours

Max. Marks : 80

## SECTION - A

Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

1. Give the principle of TGA and DTA.
2. Discuss the DSC profile of ammonium nitrate.
3. Discuss the bonding and structure of  $\text{Sn}^{2+}$  and  $\text{Sn}^{4+}$  compounds by Mossbauer spectroscopy.
4. Give the principle of NQR spectroscopy. What is the significance of NQR coupling constant.
5. What are isotropic and anisotropic hyperfine coupling constants?
6. Give EPR applications with reference to inorganic free radicals.
7. What is Koopman's theorem? Give important limitations.
8. Give the principle of ultraviolet photo electron spectroscopy (UPS). Mention the important radiation sources used in UPS.

## SECTION - B

Answer ALL questions. All questions carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) Discuss in detail the thermogravimetric analysis of  $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  compound.

Or

- (b) Discuss in detail the principle of DSC and its application to the analysis of chlorates.

[P.T.O.]



10. (a) Give the detailed instrumentation involved in Mossbauer spectroscopy. What are the important spectral parameters?

Or

- (b) With appropriate examples discuss in detail the applications of NQR spectroscopy.
11. (a) What is 'g' factor? Discuss in detail various factors affecting the 'g' factor?

Or

- (b) Give a brief account on Zero field splitting and Kramer's degeneracy. Discuss the EPR spectrum of bis-(salicylidimine)-copper (II) complex.
12. (a) Give the block diagram of photoelectron spectrophotometer. Explain various X-ray sources involved in XPES.

Or

- (b) Discuss in detail the application of UPS to  $O_2$  and  $N_2$  molecules.

M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2018

THIRD SEMESTER

Branch — Chemistry

CHE 301 — INORGANIC CHEMISTRY – III

(Under CBCS Revised syllabus w.e.f. 2015-2016)

Time : 3 hours

Max. Marks : 70/80

PART - A

Answer any FOUR questions.

All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

1. Discuss the structural aspects of cytochrome C and mention its function.
2. Sketch the active site structure of carboxypeptidase and describe its function.
3. Give the principle of Massbauer spectroscopy. Calculate the mecoil velocity of the nucleide of mass  $6.63 \times 10^{-25}$  kg that emits  $\gamma$ -rays of wavelength 0.05nm, ( $h = 6.626 \times 10^{-34}$  JS).
4. What are isomer shift and quadrupole effects in Mossbauer spectroscopy? Explain.
5. What are the factors that affect the  $g$  value? Calculate the  $g$  value of the  $CH_3$  radical which exhibits ESR signal at 3290 G in a spectrometer operating at 9230 MHz.
6. With appropriate energy level diagrams sketch and interpret the ESR spectra of  $[VOF_5]^{3-}$  and  $[Mn(H_2O)_6]^{2+}$  ( $I$  of  $^{51}V = \frac{7}{2}$ ,  $^{55}Mn = \frac{5}{2}$ ).
7. Explain the principle involved in UV-PES.
8. State Koopman's theorem and explain its significance.

[P.T.O.]



## PART - B

Answer ALL questions.

Each questions carry  $12\frac{1}{2}$  and 15 marks.

(Marks :  $4 \times 12\frac{1}{2} = 50/4 \times 15 = 60$ )

9. (a) Why are superoxides and peroxides toxic to biological system? Name the enzymes which revolve them. Discuss their structural features and mechanism of functioning.
- Or
- (b) Discuss the structural aspects of biological oxygen carriers.
10. (a) Draw the block diagram of Mossbauer spectrometer. Discuss its utility in the study of iron and tin compounds
- Or
- (b) Give the principles of NQR spectroscopy. Discuss its applications.
11. (a) Discuss the utility of ESR technique in the study of inorganic free medicals and iron sulphur proteins
- Or
- (b) Discuss the principles of ESR spectroscopy. Explain zero field splitting and Kramers degeneracy with suitable examples.
12. (a) Discuss the principles of XPES. Describe its utility in surface studies and structural analysis giving suitable example.
- Or
- (b) Explain the principles underlying Auger spectroscopy. Discuss its applications to surface studies and as a finger print tool.
-



M.Sc. DEGREE EXAMINATION — NOVEMBER/DECEMBER 2019

THIRD SEMESTER

Branch — Environmental Science

Open Electives

Paper IV(A) — NATURAL RESOURCES CONSERVATION

(Under CBCS w.e.f. 2017-2018)

Time : 3 hours

Max. Marks : 80

**SECTION - A**

Answer any FOUR questions. All questions carry equal marks.

(Marks :  $4 \times 5 = 20$ )

1. Briefly explain the importance of natural resources.
2. Explain the causes for the depletion of natural resources.
3. Give an account of Vanasamraksna Samithi in A.P.
4. Write a short note on ecotourism.
5. Give a brief account of land use planning model and their limitations.
6. Write a brief note on rivers and lakes in India.
7. Write a short note on restoration of mining lands.
8. Discuss briefly livestock breeding and farming.

**SECTION - B**

Answer ALL questions. All questions carry equal marks.

(Marks :  $4 \times 15 = 60$ )

9. (a) Discuss in detail the equitable use of resources for sustainable development.

Or

- (b) How can you relevant the human population explosion to the depletion of natural resources?

[P.T.O.]

10. (a) Explain in detail the social forestry and joint forest management strategy for forest conservation.

Or

- (b) Discuss briefly the state of forest cover in India and World.
11. (a) Explain the causes of soil erosion and add a note on soil conservation methods.

Or

- (b) Write about ecological importance and conservation of Wetlands.
12. (a) Discuss the environmental effects of over exploitation of mineral resources.

Or

- (b) Discuss in detail the sustainable agricultural practices and food security in India.