11422

# B.Sc. IV Semester Degree Examination, April/May - 2019

## CHEMISTRY

## PAPER - IV

Time : 3 Hours

Maximum Marks : 80

***Instructions to Candidates:***

1. The Question paper has Four sections. All sections are compulsory.
2. Answer for all sections should be written in the same answer book.

### Section-A

### (Inorganic, Organic, Physical)

I. Answer any **Ten** of the following **(10×2=20)**

a) Define nuclear chemistry.

b) Write the electronic configuration of Cr and Cu.

c) What are f-block elements?

d) What is meant by lanthanide contraction?

e) Define artificial radioactivity.

f) Give one method of synthesis of acid-chloride.

g) What is Knoevenagel condensations.

h) Give synthesis of ketones from nitriles.

i) Define optical Isomerism.

j) What are Enantiomers?

k) What is meant by efficiency?

l) Define degrees of freedom.

m) What is Isotopic effect?

n) What type of molecules shows vibrational spectra?

o) Give the criteria for spontaneity of process in terms of entropy and free energy.

**[P.T.O.**

## Section-B

## (Inorganic)

II. Answer any **Two** of the following (2×4=8)

a) Explain the ionization energy and atomic size of 3d-series elements.

b) Give the general properties of Lanthanides with respect to colour and magnetic properties.

c) Explain n/p ratio of nuclear stability.

III. Answer any **Two** of the following: (2×6=12)

a) Explain the properties of 3-d series elements with respect to

i) Electronic configuration

ii) Variable oxidation states

iii) Colour and spectra

b) Discuss the artificial transmutation of elements using protons, neutrons and their relative efficiency as projectiles.

c) Explain Ion-exchange method for the separation of Lanthanides.

## Section-C

## (Organic)

IV. Answer any **Two** of the following (2×4=8)

a) Give the reactions of

i) Perkins reaction and

ii) Cannizaro reaction

b) Give synthesis and reaction of Acid Amides

c) Explain the optical isomerism of tartaric acid

V. Answer any **Two** of the following: (2×6=12)

a) Explain the mechanism of

i) Benzoin reaction

ii) Aldol reaction

b) How ester is prepared? Explain the mechanism of base catalyzed hydrolysis of ethyl acetate.

c) Define Geometrical isomerism? Explain geometrical isomerism in E-Z-system with examples

## Section-I

## (Physical)

VI. Answer any **Two** of the following (2×4=8)

a) Explain Helmohltz and Gibb's free energy and give their relationship

b) Explain Born-Oppenheiner approximation

c) Write a note on Raman-Spectrum of diatomic molecules

VII. Answer any **Two** of the following: (2×6=12)

a) Discuss carnot cycle details

b) Discuss the puré rotational Raman spectrum for a diatomic molecule.

c) What is selection rules? Explain Franck-Condon principle.

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# B.Sc. IV Semester Degree Examination, September/October 2022
## Paper – IV : CHEMISTRY (New)

Time : 3 Hours Max. Marks : 60

**Instructions :** 1) Part – **A** : ***All*** *questions are* ***compulsory.***
2) Part – **B** : *Answer* ***any five*** *full questions.*

### PART – A

1. Answer **all** the following questions. (10×1=10)

a) Define Nuclear chemistry.

b) What are d-block elements ? Why they are called transition element ?

c) Define optical activity.

d) $Cu^{+2}$ ion are coloured and paramagnetic while $Zn^{+2}$ ion are colourless and diamagnetic. Explain.

e) Give one method of synthesis of aldehyde from acid chloride.

f) What is chirality ?

g) Define surface tension.

h) What are Helmholtz and Gibb's free energy ?

i) What kind of molecules show vibrational spectra ?

j) Define Second Law of thermodynamics.

### PART – B

Answer **any five** of the following questions. (5×10=50)

2. a) Discuss the artificial transmutation of elements using protons, neutrons and the relative efficiency as projectiles. 4

b) Explain : 6

i) Radioactive Decay Series

ii) Induced radioactivity. 4

3. a) Explain the 3-d series elements with respect to

i) Variable oxidation states

ii) Magnetic property. 6

b) Explain Ion exchange process for separation of Lanthanides.

P.T.O.

4. a) How ketones are prepared from carboxylic acid ? Give any 2 chemical properties of carbonyl compounds.
   b) Explain the mechanism of Aldol condensation.

5. a ) Explain the sequence and priority rule.
   b) Explain Beckmann Rearrangement.

6. a) Explain the effect of temperature on viscosity.
   b) Explain the determination of Refractive index by using Abbe's Refractometer.

7. a) Derive an expression for entropy change of an ideal gas with change in pressure and temperature.
   b) Discuss carnot cycle in detail.

8. a) Explain :
      i) Electromagnetic spectrum
      ii) Born-oppenheimer approximation.
   b) Explain Maxwell-Boltzmann distribution using population distribution.