8. (a) What is the structure of : 2

(i) Formalin

(ii) Acetophenone

(b) Explain reactivity order among aldehydes and ketones towards nucleophilic addition reaction on the basis of : 4

(i) Inductive effect

(ii) Steric effect.

(c) Explain the mechanism of following reaction : 6

(i) Aldol condensation

(ii) Wittig reaction

9. (a) Write the following reactions : 8

(i) Gabriel Phthalimide reaction

(ii) Hofmann bromamide reaction

(iii) Benzoin condensation

(iv) Diazotisation reaction

(b) Do the following conversions : 4

(i) Aniline into Acetanilide

(ii) Ethanamine into Ethyl-isocyanide

(iii) Ethanal into Acetone

(iv) Propanone into Iodoform



*Roll No.* .....

# 41256

## B. Sc. (Hons.) Mathematics 4th Semester Examination – May, 2019

### CHEMISTRY-IV

**Paper : BHM-245 Opt.-ii**

*Time : Three hours ]* *[ Maximum Marks : 60*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

***Note :*** Attempt ***five*** questions in all, selecting not more than ***two*** questions from each Section.

### SECTION – I

1. (a) Define auto-ionisation. Write self ionization reaction of : $H_2O$, $NH_3$, $SO_2$. 4

(b) Explain the nature of $SOCl_2$, $Na_2SO_3$ as acid /base in liquid $SO_2$ as a solvent. 4

(c) Write down the general characteristics of Lanthanides. 4

2. (a) Give points of similarities between lanthanides and actinides. 5

(b) Explain Bronsted-Lowry Acid & Base concept with example. 5

(c) Why Actinides have more tendency to form complexes than actinides. 2

**3.** (a) Define Lewis acid and Lewis base with an example. 3

(b) Select following as acid and base with reason : $AlCl_3$, $H_2O$, $NH_3$, $HCl$. 4

(c) Explain Hard & Soft Acid & Base concept with example. 3

(d) Name the Lanthanide which is radioactive. 1

(e) Define Transuranic elements with example. 1

## SECTION – II

**4.** (a) Explain 3rd law of thermodynamics along with their application. 3

(b) Derive Clausius-Claypeyron equation. 5

(c) Write a note on : 4

(i) Weston standard cell

(ii) Standard Hydrogen Electrode

**5.** (a) Explain the spontaneity of the process in terms of : 6

(i) Free energy

(ii) Enthalpy

(iii) Entropy

(b) Define : 2

(i) Standard electrode potential

(ii) Activity





(c) Give differences between Electrolytic c Electrochemical cell.

**6.** (a) Prove that :

(i) $dG = VdP - SdT$

(ii) $dA = -PdV - SdT$

(iii) $\Delta S = C_P \ln \frac{T_2}{T_1} + R \ln \frac{P_1}{P_2}$

(b) Derive thermodynamically the Law of che equilibrium.

## SECTION – III

**7.** (a) How can you differentiate in between following using IR spectra :

(i) Methanal and propan-2-one

(ii) Cis-l, 2-dichloroethene and trans-l, 2-dichlo ethene

(iii) Acetic acid and acetate anion

(iv) Benzoic acid and Ethanol

(b) Define :

(i) Finger print region

(ii) Bathochromic shift

(iii) Fundamental vibration

(iv) Hooke's law