

This question paper contains 3 printed pages]

BF—38—2016

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2016

CHEMISTRY

Paper XIII

(Physical Chemistry and Inorganic Chemistry)

(Thursday, 13-10-2016)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—10+30=40

N.B. :—(i) Attempt All questions.

(ii) Use same answer-book for Section 'A' and Section 'B'.

(iii) Use of logarithmic table and non-functional calculator is allowed.

Section A

(Physical Chemistry)

1. Answer any *five* of the following : 5×2=10
- (a) What are the applications of Nernst's distribution law ?
 - (b) State and explain Nernst's distribution law.
 - (c) Explain the kinetics of decomposition of HI.
 - (d) Discuss the opposing reaction with an example.
 - (e) Write a short note on Raman effect.
 - (f) What are the characteristics of third order chemical reaction ?
 - (g) Discuss the factors affecting broadening of spectral lines.
2. Answer any *two* of the following : 2×5=10
- (a) Discuss the kinetics of consecutive reaction.

P.T.O.

- (b) Explain the rotational Raman spectrum of diatomic molecule.
- (c) The pure rotational spectrum of gaseous diatomic molecule consist of a series of equally spaced lines separated by 17.86 cm^{-1} . Calculate internuclear distance of the molecule. The reduced mass of molecule is $1.43 \times 10^{-27} \text{ kg}$.
- ($h = 6.6 \times 10^{-34} \text{ J.s.}$, $c = 3 \times 10^8 \text{ m/s}$, $\pi = 3.14$)
3. Answer any *one* of the following : 7
- (a) Prove that frequency separation between successive lines in rotational spectrum of rigid rotator is $2B \text{ cm}^{-1}$.
- (b) (i) Derive an expression for equilibrium constant from distribution coefficient.
- (ii) The following data were obtained for distribution of organic solute between water (C_1) and chloroform (C_2) :
- | | | |
|-------|--------|--------|
| C_1 | 0.0161 | 0.0238 |
| C_2 | 0.339 | 0.754 |
- Determine molecular state of solute in chloroform.

Section B

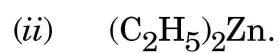
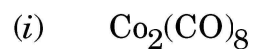
(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9
- (a) How organometallic compounds are classified ?
- (b) Give any *three* methods of preparation of organolithium compounds.
- (c) What are the applications of organotin compounds ?
- (d) Draw the structure of $\text{Fe}_2(\text{CO})_9$, $\text{Ir}_4(\text{CO})_{12}$ and $\text{Co}_2(\text{CO})_8$.
- (e) Give the method of preparation of Nickel tetracarbonyls.

5. Solve any *two* of the following :

2×2=4

(a) Give IUPAC names of the following :



(b) How will you obtain alkane and carboxylic acid from organolithium compound ?

(c) What are the medical uses of organotitanium compounds ?

(d) What are metal carbonyls ? Give example.