



I Semester B.Sc. Examination, November/December 2016  
(CBCS) (Semester Scheme)  
Paper – I : CHEMISTRY  
(2016 Batch Onwards)

Time : 3 Hours

Max. Marks : 70

**Instructions :** 1) **Use SI units.**  
2) **Write equations and neat diagrams wherever necessary.**

## PART – A

Answer the following in a **word, phrase** or a **sentence** : (6×1=6)

1. a) Define co-valent radius.
- b) What are free radicals ?
- c) Define critical volume.
- d) What is adsorption ?
- e) State Auf-bau-principle.
- f) Give an example for cumulated diene.

## PART – B

Answer **any five** of the following questions : (5×2=10)

2. a) Discuss the stability of carbanion. 2
- b) State and explain Hund's rule. 2
- c) State Saytsoff's rule. 2
- d) Define electron affinity. 2
- e) Write differences between physical and chemical adsorptions. 2
- f) Write a note on Joule-Thomson effect. 2



PART – C  
(Inorganic Chemistry)

Answer **any three** of the following questions : (6×3=18)

3. a) Define Ionisation energy. How does it vary in a period and in a group ? 3  
b) Explain (n + 1) rule with an example. 3
4. a) Write Schrodinger wave equation and explain the terms involved. 2  
b) Explain why half filled and completely filled orbitals are more stable than the other configurations. 4
5. a) What are isoelectronic ions ? Give example. 2  
b) Explain Heisenberg's uncertainty principle and give its significance. 4
6. a) Discuss Slater's rule for calculating effective nuclear charge. 3  
b) Explain Pauli's exclusion principle with an example. 3

PART – D  
(Organic Chemistry)

Answer **any three** of the following questions : (6×3=18)

7. a) What are carbocations ? Explain the relative stability of 1°, 2° and 3° carbocations with examples. 4  
b) Explain Anti-Markownikoff's rule with an examples. 2
8. a) Define rearrangement reaction, write pinacol-pinacolone rearrangement reaction. 4  
b) Explain inductive effect with example. 2
9. a) Give the classification of dienes, examples for each. 4  
b) Explain the mechanism of SN<sup>2</sup> reaction. 2
10. a) Discuss the effect of substrate on E<sub>1</sub> and E<sub>2</sub> elimination reaction. 4  
b) Explain hyper conjugation effect on propene. 2



PART – E  
(Physical Chemistry)

Answer **any three** of the following questions :

(6×3=18)

- |        |   |   |   |
|--------|---|---|---|
| 11. a) | Write a note on Andrews experiment on carbon dioxide.                         | 4   |   |
|        | b)  | Calculate the RMS velocity of CO <sub>2</sub> molecule at 30°C.                                   | 2 |
| 12. a) | Derive the reduced equation of state.   | 4   |   |
|        | b)  | Give the significance of Maxwell-Boltzmann equation for the distribution of molecular velocities. | 2 |
| 13. a) | Explain Freundlich's adsorption isotherm.                                     | 3   |   |
|        | b)  | What is meant by catalysis? Differentiate homogeneous and heterogeneous catalysis.                | 3 |
| 14. a) | How are critical temperature and critical pressure determined experimentally? | 4   |   |
|        | b)  | State law of corresponding state.   | 2 |



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**III Semester B.Sc. Examination, April/May 2017**  
**(Semester Scheme)**  
**(2008 to 2013)**  
**Paper – III : CHEMISTRY**

Time : 3 Hours

Max. Marks : 60

**Instructions :** 1) Use **SI Units**  
2) Write chemical **equations** and **neat** labelled diagrams **wherever** necessary.

PART – A

1. Answer **all** the questions : (6×1=6)
- What are pseudohalogens ?
  - Name the geometrical shape of  $\text{XeO}_3$ .
  - Write the IUPAC name of  $\text{H}_3\text{C} - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{COOH}$ .
  - Formaldehyde does not undergo aldol condensation, why ?
  - State phase rule.
  - What are Isotonic solutions ?

PART – B

**(Inorganic Chemistry)**

- Answer **any three** questions : (3×6=18)
- Write the molecular orbital diagram of  $\text{N}_2$  molecule and predict its magnetic property. 3
    - Explain the structure of diborane. 3
  - Explain linear combination of atomic orbitals. 3
    - Discuss the electronic configuration and oxidation state of p-block elements. 3



4. a) How is  $\text{XeF}_4$  prepared ? Write its structure. 3  
b) Write a note on clathrates. 3
5. a) Explain any two properties of interhalogen compounds. 3  
b) How is cyanogen prepared ? Mention its uses. 3
6. a) How is  $\text{BF}_3$  prepared ? How does it act as a catalyst ? 4  
b) Mention the similarities between halogens and pseudohalogens. 2

## PART – C

## (Organic Chemistry)

Answer **any three** questions :

(3×6=18)

7. a) How is acetoacetic ester converted into :  
i) Butanoic acid  
ii) Succinic acid. 4  
b) Explain the reaction of acetone with  $\text{C}_2\text{H}_5\text{Mg} - \text{Br}$ . 2
8. a) Explain Keto-enol tautomerism in aceto acetic ester. 3  
b) Write the preparation of Malonic ester. 3
9. a) Explain the Perkin's reaction with mechanism. 4  
b) Discuss the classification of carboxylic acids. 2
10. a) How are aldehydes prepared from acid chlorides ? 2  
b) i) Explain the synthesis of tartaric acid.  
ii) What is the effect of heat on  $\beta$ -hydroxy acid ? 4
11. a) Explain esterification reaction with an example. 2  
b) What is Schmidt rearrangement ? 2  
c) Aromatic acids are stronger than aliphatic acids. Why ? 2



PART – D  
(Physical Chemistry)

Answer any three questions :

(3x6=18)

12. a) State and derive the Raoult's law for lowering of vapour pressure. 4  
b) A solution of 12.5 g of an unknown solute in 170 g of water gave a boiling point elevation of 0.63. Calculate the molar mass of the solute ( $K_b = 0.52 \text{ K m}^{-1}$ ). 2
13. a) Discuss the 2-component system of  $\text{FeCl}_3 - \text{H}_2\text{O}$  system. 4  
b) Explain the effect of dissolution of a solute on the osmotic pressure of a solution. 2
14. a) Describe the determination of osmotic pressure by Berkeley-Hartley method. 4  
b) Define the term degrees of freedom with an example. 2
15. a) Explain temperature composition diagram for lead-silver system. 4  
b) What is semipermeable membrane? How is it prepared? 2
16. a) Explain :  
i) Freezing mixtures  
ii) Abnormal molecular mass. (2+2)  
b) Write a note on plasmolysis. 2

10/5/12  
1)

V Semester B.Sc. Degree Examination, April/May 2017  
(Semester Scheme) (2008-2013)  
**CHEMISTRY**  
Paper – VI : Organic Chemistry

Time : 3 Hours

Max. Marks : 60

**Instruction :** Write equations and structures **wherever** necessary.

## PART – A

Answer all the questions :

(10×1=10)

1. a) Write the structure of vitamin H.
- b) What are detergents ?
- c) Give an example for animal wax.
- d) What is phosphorescence ?
- e) Mention the importance of paracetamol.
- f) How many  $^1\text{H}$  NMR signals would you expect for acetone molecule ?
- g) Name the monome unit present in nylon 6,6.
- h) Define chromogen.
- i) Which product is obtained when benzophenone is reduced in the presence of light ?
- j) Write the IR absorption frequency range for phenolic OH.

## PART – B

Answer any five questions :

(5×4=20)

2. Explain the Norrish type II photochemical reactions. 4
3. Outline the synthesis and application of neoprene. 4
4. Discuss the chemical shift, citing examples. 4

P.T.O.



5. Differentiate : 4
- i) Bathochromic shift and hypsochromic shift
  - ii) Chromophore and auxochrome.
6. What are vitamins ? Give the occurrence and functions of vitamin D. 4
7. Discuss the mechanism involved in cleansing action of soaps. 4
8. Write the structure of penicillin G and explain its mode of action. 4

## PART - C

Answer **any five** questions :

(5×6=30)

9. a) What are dyes ? Give the synthesis of malachite green. 3
- b) Explain the merits and demerits of soaps and detergents. 3
10. a) Elaborate Woodward-Hoffmann's rules taking examples. 4
- b) What is step growth polymerization ? Give an example. 2
11. a) Discuss the mechanism of cis-trans photochemical isomerism of stilbene. 4
- b) Mention the uses of sulphanilamide. 2
12. a) Write a note on iodine value of oils. 3
- b) Describe the synthesis of aspirin. 3
13. a) What is Barton reaction ? Give its mechanism. 3
- b) Discuss the (n + 1) rule in NMR spectrum of ethanol. 3
14. a) Define oils and fats with examples. 2
- b) What are thermoplastic and thermosetting resins ? Give examples. 4
15. a) Explain the classification of dyes with suitable examples. 4
- b) Mention the applications of IR spectroscopy. 2
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PE 264



V Semester B.Sc. Examination, April/May 2017  
(Scheme 2008 – 2013)  
**CHEMISTRY**  
Physical Chemistry (Paper – VII)

Time : 3 Hours

Max. Marks : 60

**Instruction : Use SI Units, appropriate diagrams and chemical equations wherever necessary.**

PART – A

Answer **all** the questions.

(1×10=10)

1. a) State Stark-Einstein law.
- b) What is bio-luminescence ?
- c) Define molar extinction coefficient.
- d) What are buffer solutions ?
- e) Define rad.
- f) What is ionic mobility ?
- g) Define electrochemical series.
- h) Give an example for amalgam electrodes.
- i) Write the sign convention for electrode potential.
- j) What are fuel cells ?

PART – B

Answer **any five** of the following.

(5×4=20)

2. What is quantum yield ? Discuss the quantum yield of HCl formation. 4
3. Describe the construction and working of a spectrophotometer. 4
4. Explain electrochemical theory of corrosion. 4
5. a) Give the radiolysis of water. 2
- b) How does molar conductance vary with dilution ? 2

P.T.O.



6. Discuss the conductometric titration of mixture of HCl and  $\text{CH}_3\text{COOH}$  against NaOH. 4
7. The specific conductance of a saturated solution of AgCl at  $25^\circ\text{C}$  was  $3.41 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$ . Specific conductance of water is  $1.6 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$ . Determine solubility of AgCl in g/litre. 4
8. Derive Nernst equation for electrode potential. 4

## PART - C

Answer **any five** of the following. (5×6=30)

9. a) State Lambert-Beers law. Derive its mathematical expression. 4  
b) Explain fluorescence. 2
10. a) Calculate the transport number of  $\text{H}^+$  ions and  $\text{Cl}^-$  ions in 0.1 N HCl solution where the mass of silver deposited in coulometer is 0.1209 g. The movement of boundary and cross sectional area are 7.5 cm and  $1.24 \text{ cm}^2$  respectively. 4  
b) Outline the importance of pH maintenance in sugar industry. 2
11. a) Write a note on Uranyl oxalate actinometer. 3  
b) Give any three differences between photochemistry and radiation chemistry. 3
12. a) What is liquid junction potential ? How is it eliminated ? 2  
b) Explain cathodic protection. 2  
c) What are reversible electrodes ? 2
13. a) Derive Hendersons equation for an acid buffer. 3  
b) Describe the construction of a dry cell. 3
14. a) How is pH of solution determined by quinhydrone electrode ? 4  
b) Give any two important features of electrochemical series. 2
15. a) Write a note on Weston standard cell. 3  
b) Stating Kohlrausch's law, calculate the equivalent conductance of  $\text{NH}_4\text{OH}$  at infinite dilution where the conductances of  $\text{NH}_4\text{Cl}$ , NaOH and NaCl at infinite dilutions are  $128.5 \Omega^{-1} \text{ cm}^2$ ,  $217.4 \Omega^{-1} \text{ cm}^2$  and  $108.9 \Omega^{-1} \text{ cm}^2$  respectively. 3

V Semester B.Sc. Examination, April/May 2017  
(Semester Scheme) (2008-2013)  
**CHEMISTRY**  
Inorganic Chemistry (Paper – V)

Time : 3 Hours

Max. Marks : 60

**Instruction :** Write equations and **neat** diagrams **wherever** necessary.

## PART – A

Answer the following :

(10×1=10)

1. a) Name the organic reagent used in the calorimetric estimation of iron.
- b) What is the oxidation state of Nickel in  $[\text{Ni}(\text{CO})_4]$  ?
- c) Define the term accuracy.
- d) Write the structure of DMG.
- e) Tetrahedral complexes are generally high spin. Why ?
- f) What is stability constant of a complex ?
- g) Define co-ordination number.
- h) What is a chelating ligand ?
- i) In gravimetric analysis, why is the precipitant added in hot condition ?
- j) What is an ambidentate ligand ?

## PART – B

Answer **any five** of the following :

(5×4=20)

2. Explain geometrical isomerism among the complexes with co-ordination number six. 4
3. Explain the factors which affect the stability of the complexes. 4

P.T.O.



4. What are ligands ? How are they classified ? 4
5. Write the advantages of organic reagents over inorganic reagents, in inorganic analysis. 4
6. Give the classification of errors. How are they minimised ? 4
7. Explain the separation of lanthanides by ion exchange method. 4
8. Explain the general characteristics of d-block elements. 4

## PART - C

Answer **any five** of the following :

(5×6=30)

9. a) Explain the conditions of precipitation. 3
  - b) Define hydrate isomerism and write the isomers of  $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ . 3
  10. a) Explain lanthanide contraction. What are its consequences ? 4
  - b) Explain the factors which affect crystal field splitting. 2
  11. a) Discuss the splitting of d-orbitals in octahedral complexes. 4
  - b) Write a note on spectro chemical series. 2
  12. a) What are high spin and low spin complexes ? Explain with suitable examples. 4
  - b) Briefly explain paramagnetism of d-block elements. 2
  13. a) How is the formation of complex ion detected by conductance and colour change method ? 4
  - b) Write the structure of 1,10-phenanthroline. 2
  14. a) Explain co-precipitation and post precipitation with an example for each. 4
  - b) What are intermetallic complexes ? 2
  15. a) Write the limitations of VBT. 4
  - b) Give the expression for the calculation of standard deviation. 2
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