# FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2020

Chemistry

## CHE 1C 01—GENERAL CHEMISTRY—I

(2019 Admissions)

Time : Two Hours                        Maximum : 60 Marks

### Section A

*Answer at least **eight** questions.*
*Each question carries 3 marks.*
*All questions can be attended.*
*Overall Ceiling 24.*

1. Define molarity of a solution.

2. What is meant by standard solution ?

3. Mention two advantages of microanalysis.

4. What is meant by common ion effect ?

5. State and explain Pauli's exclusion principle.

6. What is the shape of $IF_7$ molecule ?

7. What are isotones ? Give an example.

8. What is nuclear fission ? Name two nuclei fissionable by thermal neutrons.

9. Mention any *two* applications of radioisotopes in medicine.

10. What are and how many types of essential elements are there ?

11. Name two metal ion that are needed in relatively large quantities for biochemical process.

12. Mention difference between haemoglobin and myoglobin.

$(8 \times 3 = 24 \text{ marks})$

**Turn over**

## Section B

*Answer at least* **five** *questions.*
*Each question carries 5 marks.*
*All questions can be attended.*
*Overall Ceiling 25.*

13. Explain application of solubility product in group separation of cations.

14. Calculate the wavelength of particle of mass $6.6 \times 10^{-17}$kg moving with a kinetic energy $7.425 \times 10^{-13}$ kg. $m^2 s^{-2}$.

15. Define lattice energy. How does it affect solubility of ionic substance ?

16. The amount of $^{14}C$ present in an old piece of wood is found to be one-sixth of that present in fresh piece of wood. Calculate age of wood if $t_{1/2}$ of carbon is 5668 years.

17. Explain nuclear fusion with example. Why fusion reactions are called thermonuclear reactions ?

18. Write name and functions of three zinc containing enzymes.

19. Explain sodium-potassium pump.

$(5 \times 5 = 25 \text{ marks})$

## Section C

*Answer any* **one** *question.*
*The question carries 11 marks.*

20. Discuss various theories and limitations of acids and bases.

21. What are the postulates of molecular orbital theory ? Construct energy level diagram for the electrons in oxygen molecule and account for its paramagnetic behavior.

$(1 \times 11 = 11 \text{ marks})$

**D 32344**　　　　　　(Pages : 2)　　　　　Name......................................

Reg. No...............................

## FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
## NOVEMBER 2022

Chemistry

CHE 1C 01—GENERAL CHEMISTRY

(2019—2022 Admissions)

Time : Two Hours　　　　　　　　　　　　　　　　　　　　Maximum : 60 Marks

### Section A (Short Answers)

*Answer questions up to* 20 *marks.*
*Each question carries* 2 *marks.*

1. Define oxidation and reduction in terms of oxidation number.

2. What are redox titrations ? Give an example.

3. What is meant by microanalysis ? Mention two examples.

4. What substances are called secondary standard in titrimetry ?

5. Define Lattice energy.

6. Name two organic compounds which shows H-bonding.

7. What are nuclear forces and its different types ?

8. Explain term isotopes with suitable with suitable example.

9. What is meant by radioactive tracer ?

10. Name two trace elements in biochemistry.

11. What are metalloenzymes ?

12. Name two zinc containing enzymes.

### Section B (Short Essay)

*Answer questions up to* 30 *marks.*
*Each question carries* 5 *marks.*

13. What are metal ion indicators ? Explain their function with a suitable example.

14. A moving body with mass 0.1 mg. has wavelength of $3.312 \times 10^{-29}$ m. Calculate its kinetic energy.

**Turn over**

15. Give the shapes of following molecule on basis of VSEPR theory : (a) $BeCl_2$ : (b) $BF_3$ ; (c) $SnCl_2$.

16. State and illustrate group displacement law.

17. Calculate age of Uranium mineral that contain 0.2 g. of $^{206}Pb$ per gram of $^{238}U$. $t_{1/2}$ of Uranium is $4.5 \times 10^9$ years.

18. Write short note on role of chlorophylls in photosynthesis.

19. What structural changes do occur when haemoglobin carries oxygen and when it detaches oxygen ?

**Section C (Essay)**

*Answer any* **one** *question.*
*The question carries* 10 *marks.*

20. Describe low solubility product principle and common ion effect as applied in qualitative inorganic analysis.

21. (a) What are the postulates of Bohr atomic theory ?

    (b) How is the spectrum explained on basis of Bohr theory ?

**D 12618**                    (Pages : 2)                    Name......................................

Reg. No.................................

## FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
### NOVEMBER 2021

Chemistry

CHE 1C 01—GENERAL CHEMISTRY

(2021 Admissions)

Time : Two Hours                                        Maximum : 60 Marks

### Section A

*Answer at least* **eight** *questions.*
*Each question carries* 3 *marks.*
*All questions can be attended.*
*Overall Ceiling* 24.

1. What is meant by microanalysis ? Give two examples.

2. Calculate the momentum of a particle which has de Broglie wavelength of 0.2 nm.

   $[h = 6.6 \times 10^{-34} \text{ Js}]$

3. Mention shapes of : (i) $XeF_2$ molecule ; and (ii) $SF_6$ molecule.

4. Write all possible values of 1 if $n = 4$.

5. Draw structure of porphine.

6. What are $\pi$-mesons ?

7. Explain term nuclear chain reaction.

8. What is meant by radioactive tracer ?

9. Name two iron containing enzyme.

10. Name a vitamin known to contain metal. What is the metal ?

11. Name two trace elements in biochemistry.

12. What is called metal activated enzyme ? Give an example.

$(8 \times 3 = 24 \text{ marks})$

**Turn over**

## Section B

*Answer at least* **five** *questions.*
*Each question carries 5 marks.*
*All questions can be attended.*
*Overall Ceiling 25.*

13. Distinguish primary and secondary as applied to volumetry with example.

14. Explain function of complexometric indicators.

15. Explain shapes of $SO_4^{2-}$ and $NH_4^+$ on basis of VSEPR theory.

16. Distinguish between bonding and antibonding molecular orbitals.

17. State and illustrate group displacement law.

18. $^{14}C/^{12}C$ ratio in a piece of wood is 12 % that of atmosphere. Calculate the age of wood. Half life of $^{14}C$ = 5760 years.

19. What structural changes do occur when haemoglobin carries $O_2$ and when it detaches ?

$(5 \times 5 = 25$ marks$)$

## Section C

*Answer any* **one** *question.*
*The question carries 11 marks.*

20. (a) Briefly explain principles of solubility product and common ion effect in separation of cations in qualitative analysis ; (b) A solution contains $Cu^{2+}$ and $Ba^{2+}$. How would you separate ions and identify them.

21. What are quantum numbers ? Discuss the significance of each quantum number.

$(1 \times 11 = 11$ marks$)$

**D 52766**

Name...................................

Reg. No...............................

# FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Complementary Course—Chemistry

CHE 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 64 Marks

## Section A

*Answer all questions.*
*Each question carries 1 mark.*

1. Name a suitable indicator for the titration between acetic acid and sodium hydroxide.

2. Predict the shape of $SF_6$ molecule

3. What is the hybridization of the central atom in $PCl_5$ ?

4. The bond order in $O_2^-$ is :

5. The nuclides, $^{35}Cl$ and $^{35}Cl$ are ————.

6. Name the metal in Myoglobin.

7. Particles responsible for holding the nucleons together is called ————.

8. Predict the stability of $He_2^+$.

9. Name an indicator used in complexometric titrations.

10. Molarity of 100 ml aqueous solution of NaOH containing 4g of the solute is ————.

$(10 \times 1 = 10 \text{ marks})$

## Section B

*Answer any seven questions.*
*Each question carries 2 marks.*

11. Write briefly on radio carbon dating.

12. Explain LCAO principle with suitable example.

13. Define lattice energy. What is its significance ?

14. Write notes on mass defect.

15. What is common ion effect ?

16. Explain the importance of haemoglobin in oxygen transport.

Turn over

17. Calculate the wave length associated with a particle of mass 1g. moving with a velocity of 100 m. per sec.

18. Write briefly on redox titrations with suitable example.

19. What are the significance of quantum numbers ?

20. State and explain Group displacement law.

(7 × 2 = 14 marks)

## Section C

*Answer any **four** questions.*
*Each question carries 5 marks.*

21. Represent MO energy level diagram of CO molecule.

22. Define electron affinity. How does it vary along a group and period in the periodic table ? What are the factors influencing it ?

23. Discuss $sp^3$ hybridization with suitable example.

24. Discuss the principle of complexometric titration taking suitable example.

25. Describe the use of Pauli's exclusion principle in finding the electronic configuration of atoms.

26. Write a note on radiocarbon dating and its applications.

(4 × 5 = 20 marks)

## Section D

*Answer any **two** questions.*
*Each question carries 10 marks.*

27. Write notes on :

    (a) Nuclear fission.         (b) Nuclear fusion.

    (c) Biochemistry of cobalt.    (d) Co-ordinate bond.

28. Briefly discuss the following :

    (a) Lewis theory of acids and bases with suitable example.

    (b) Nuclear reactors.

29. (a) What is solubility product ? Discuss the application of solubility product.

    (b) Discuss valence bond theory with suitable example.

30. (a) Discuss various applications of radioactive isotopes.

    (b) Discuss the periodicity in the following properties in the light of modern periodic law and the long form of periodic table :

        (i) Atomic radii.

        (ii) Ionic radii.

(2 × 10 = 20 marks)

**(Pages : 2)**

Name...................................

Reg. No...............................

# FIRST SEMESTER B.Sc. DEGREE EXAMINATION NOVEMBER 2014

(CUCBCSS–UG)

Complementary Course – Chemistry

CHE 1C 01 – GENERAL CHEMISTRY

Time : Three Hours

Maximum : 64 Marks

## Part A (One Word/Sentence)

*Answer all questions.*

*Each question carries 1 mark.*

1. In the modern periodic table, elements are arranged in the increasing order of _____.

2. The conjugate base of $NH_4^+$ is _____.

3. Diphenyl amine is a _____ indicator.

4. A solution of known concentration is called _____.

5. _____ theory is used to explain the shapes of molecules and ions.

6. The number of electrons in an orbital is restricted to two. This is in accordance with _____.

7. Emission of _____ from a radioactive element does not change its charge or mass.

8. The $(4n + 1)$ radioactive decay series is otherwise called _____.

9. The metal present in chlorophyll is _____.

10. Protein with a prosthetic group is known as _____.

$(10 \times 1 = 10$ marks$)$

## Part B (Short Answer)

*Answer any seven questions.*

*Each question carries 2 marks.*

11. Calculate the mass of Mohr's salt (E = 392) for 100 ml 0.1 N solution.

12. Find the oxidation number of P' in $P_2O_7^{4-}$ and $H_3PO_4$.

13. What are redox titrations? Give *one* example.

14. Differentiate between accuracy and precision.

15. Write down the Schrodinger wave equation and explain the terms.

16. Calculate the number of molecules in 5.6 L of $CO_2$ gas at STP.

**Turn over**

17. Write any *two* units of radioactivity.

18. Write briefly on artificial radioactivity.

19. Give the names of any *two* nuclear power stations in India.

20. What is hydrogen bonding? Explain using $H_2O$ molecule.

$(7 \times 2 = 14$ marks)

## Part C (Paragraph)
*Answer any* **four** *questions.*
*Each question carries 5 marks.*

21. Define ionization enthalpy. How does it vary along a period and down a group? Explain.

22. Explain the principle and advantages of double burette method of titration.

23. Outline the postulates of Bohr theory and mention any *two* limitations of the theory.

24. Discuss the Pauling scale of electro negativity.

25. Write note on the applications of radioactive isotopes.

26. Explain the structure and mechanism of action of Na-K pump.

$(4 \times 5 = 20$ marks)

## Part D (Essay)
*Answer any* **two** *questions.*
*Each question carries 10 marks.*

27. (a) Explain the application of common ion effect and solubility product in qualitative analysis

(b) Write briefly on Mass defect and Binding energy.

$(6 + 4 = 10$ marks)

28. What are the features of hybridization? Describe $sp^3d$, $sp^3d^2$ and $sp^3d^3$ hybridizations usin suitable examples.

29. (a) Draw the molecular orbital diagram of CO molecule and calculate the bond order.

(b) Write briefly on the different theories of acids and bases.

$(5 + 5 = 10$ marks)

30. Discuss the mechanism of $O_2$ transport by heamoglobin.

$[2 \times 10 = 20$ marks]

**D 93764**

Name............................................

Reg. No...................................

# FIRST SEMESTER B.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION NOVEMBER 2015

(UG—CCSS)

Complementary Course

## CH 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 30 Weightage

I. Answer all the *twelve* questions. Each question carries a weightage of ¼. This section contains multiple choice, fill in the blanks and one word answer questions :—

  1  Which of the following is not possible ?

    (a)  1s.            (b)  2p.

    (c)  3f.            (d)  4f.

  2  Name the metal present in Vitamin $B_{12}$ :

  3  The lowest layer of atmosphere is : ·

    (a)  Stratosphere.        (b)  Troposphere.

    (c)  Mesosphere.         (d)  Exosphere.

  4  Ionic product of water has the value of :

    (a)  14.            (b)  $1 \times 10^{-14}$.

    (c)  $1 \times 10^{-7}$.      (d)  7.

  5  In the de Broglie relation $\lambda = h/p$, what nature of electron is manifested by $p$ ?

    (a)  Wave.          (b)  Particle.

    (c)  Dual.           (d)  Uncertainty.

  6  Which of the following errors depends on the size of the quantity being measured ?

    (a)  Constant error.      (b)  Method error.

    (c)  Random error.       (d)  Proportional error.

  7  Which of the following molecule is not linear ?

    (a)  $C_2H_2$.        (b)  $H_2O$.

    (c)  $BeF_2$.        (d)  $CO_2$.

  8  Which of the following molecule does not contain iron ?

    (a)  Haemoglobin.      (b)  Myoglobin.

    (c)  Cytochrome.       (d)  Haemocyanin.

**Turn over**

9  The suitable indicator for the titration of oxalic acid and sodium hydroxide is ————.

10  Solubility product of AgCl is given by :

    (a)  $[Ag^+][Cl^-]$.

    (b)  $[Ag^+]/[Cl^-]$.

    (c)  $[Ag^+]+[Cl^-]$.

    (d)  $\sqrt{[Ag^+][Cl^-]}$.

11  In $PCl_5$, the hybridization of P is :

    (a)  $sp^3d$

    (b)  $sp^3d^2$.

    (c)  $dsp^2$.

    (d)  $d^2sp^3$.

12  Which of the following is not an environmental segment ?

    (a)  Atmosphere.

    (b)  Hydrosphere.

    (c)  Lithosphere.

    (d)  Stratosphere.

                                                                         (12 × ¼ = 3 weightage)

II.  Answer all the *nine* questions. Each question carries a weightage of 1 :

13  Distinguish between COD and BOD.

14  What are non-bonding orbitals ?

15  What is nitrogen cycle ? What is its significance ?

16  Mention *two* factors which affect the lattice energy of an ionic compound.

17  What is the toxic effect of CN-on haemoglobin ?

18  Write the Schrödinger wave equation and explain the terms.

19  Give the structure of cis-platin. How does cis-platin act against cancer ?

20  What is $R_f$ value ?

21  What is Lewis acid and base ? Give examples.

                                                                         (9 × 1 = 9 weightage)

III.  Answer any *five* questions. Each question carries a weightage of 2 :

22  Explain the consequences of acid rain.

23  The uncertainty in the position of an electron is $10^{-10}$ m. What is its uncertainty in velocity ? ($h = 6.6 \times 10^{-34}$ Js).

24  Write note on green house effect.

25   Using the theory of hybridization, explain the variation in the bond angles of methane ethylene and acetylene.

26   What is significance of sodium potassium pump in living cells ?

27   What are systematic and random errors ?

28   What are redox indicators ? Give one example.

(5 × 2 = 10 weightage)

IV.   Answer any *two* questions. Each question carries a weightage of 4 :

29   (a)   Draw the molecular orbital energy diagram for oxygen molecule and predict its bond order and magnetic property.

(b)   What are the limitations of Bohr atom model ?

30   Mention the different type of errors in analytical determination. What are the methods for the reduction of such errors ?

31   What is hard water ? Discuss different methods for the removal of hardness of water.

(2 × 4 = 8 weightage)

D 13820

(Pages : 2)

Name...............................

Reg. No.......A.I.A.Q.S.P.H030

# FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

## (CUCBCSS–UG)

Complementary Course

CHE 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 64 Marks

### Section A (One Word)

*Answer all questions.*
*Each question carries 1 mark.*

1. The volume of $6.02 \times 10^{23}$ atoms of hydrogen gas at STP is ———.

2. The oxidation state of Mn in $K_2MnO_4$ is ———.

3. In the titration of Mohr's salt against potassium permanganate, ——— is used to acidify the solution.

4. The shape of $CIF_3$ is ———.

5. A subshell with $n = 5$, $I = 3$ is designated as ———.

6. ——— restricts the number of electrons in an orbital to two.

7. Determination of age of minerals is known as ———.

8. The first nuclear reactor in India is located at ———.

9. ——— is a haemo protein.

10. ——— is a complex of $Mg^{2+}$ with prophyrin.

$(10 \times 1 = 10 \text{ marks})$

### Section B (Short Answers)

*Answer any seven questions.*
*Each question carries 2 marks.*

11. What is the cause of periodicity in properties of elements ?

12. Methyl orange is not a suitable indicator in the titration of a weak acid against a strong base. Why ?

13. Differentiate accuracy and precision of a measurement.

14. Give any *two* advantages of microanalysis.

15. Write the Schrodinger wave equation and explain the terms involved.

16. Explain the anomalous electronic configuration of Chromium.

17. Ice floats over water. Why ?

**Turn over**

18. What is meant by K-electron capture ?

19. How is the stability of the nucleus related to n/p ratio ? Explain.

20. State Soddy's group displacement law.

(7 × 2 = 14 marks)

## Section C (Paragraph)

*Answer any* **four** *questions.*
*Each question carries 5 marks.*

21. Define ionization enthalpy of an element. What are the factors influencing ionization enthalpy ?

22. Explain the applications of common ion effect and solubility product in qualitative analysis.

23. Write a note on double burette method of titration.

24. Explain the geometry of $IF_5$ molecule on the basis of VSEPR theory.

25. Describe radiocarbon dating.

26. Explain the mechanism of action of sodium-potassium pump.

(4 × 5 = 20 marks)

## Section D (Essay)

*Answer any* **two** *questions.*
*Each question carries 10 marks.*

27. (a) Describe the various theories of acids and bases.

    (6 marks)

    (b) Write a note on origin of modern Chemistry.

    (4 marks)

28. Describe the mechanism of $O_2$ transportation.

29. Briefly describe the postulates of Bohr's model of the atom, its merits and demerits.

30. (a) Explain the theory of acid-base indicators.

    (6 marks)

    (b) Differentiate isotopes and isotones with examples.

    (4 marks)

[2 × 10 = 20 marks]

**D 93764**

Name........................................

Reg. No..................................

# FIRST SEMESTER B.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION NOVEMBER 2015

## (UG—CCSS)

### Complementary Course

### CH 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 30 Weightage

I. Answer all the *twelve* questions. Each question carries a weightage of ¼. This section contains multiple choice, fill in the blanks and one word answer questions :—

1  Which of the following is not possible ?

    (a)  1s.

    (b)  2p.

    (c)  3f.

    (d)  4f.

2  Name the metal present in Vitamin $B_{12}$ :

3  The lowest layer of atmosphere is : ·

    (a)  Stratosphere.

    (b)  Troposphere.

    (c)  Mesosphere.

    (d)  Exosphere.

4  Ionic product of water has the value of :

    (a)  14.

    (b)  $1 \times 10^{-14}$.

    (c)  $1 \times 10^{-7}$.

    (d)  7.

5  In the de Broglie relation $\lambda = h/p$, what nature of electron is manifested by $p$ ?

    (a)  Wave.

    (b)  Particle.

    (c)  Dual.

    (d)  Uncertainty.

6  Which of the following errors depends on the size of the quantity being measured ?

    (a)  Constant error.

    (b)  Method error.

    (c)  Random error.

    (d)  Proportional error.

7  Which of the following molecule is not linear ?

    (a)  $C_2H_2$.

    (b)  $H_2O$.

    (c)  $BeF_2$.

    (d)  $CO_2$.

8  Which of the following molecule does not contain iron ?

    (a)  Haemoglobin.

    (b)  Myoglobin.

    (c)  Cytochrome.

    (d)  Haemocyanin,

**Turn over**

9   The suitable indicator for the titration of oxalic acid and sodium hydroxide is ————.

10  Solubility product of AgCl is given by :

   (a)  $[Ag^+][Cl^-]$.              (b)  $[Ag^+]/[Cl^-]$.

   (c)  $[Ag^+]+[Cl^-]$.            (d)  $\sqrt{[Ag^+][Cl^-]}$.

11  In $PCl_5$, the hybridization of P is :

   (a)  $sp^3d$                      (b)  $sp^3d^2$.

   (c)  $dsp^2$.                     (d)  $d^2sp^3$.

12  Which of the following is not an environmental segment ?

   (a)  Atmosphere.                  (b)  Hydrosphere.

   (c)  Lithosphere.                 (d)  Stratosphere.

                                                    (12 × ¼ = 3 weightage)

II.  Answer all the *nine* questions. Each question carries a weightage of 1 :

   13  Distinguish between COD and BOD.

   14  What are non-bonding orbitals ?

   15  What is nitrogen cycle ? What is its significance ?

   16  Mention *two* factors which affect the lattice energy of an ionic compound.

   17  What is the toxic effect of CN-on haemoglobin ?

   18  Write the Schrödinger wave equation and explain the terms.

   19  Give the structure of cis-platin. How does cis-platin act against cancer ?

   20  What is $R_f$ value ?

   21  What is Lewis acid and base ? Give examples.

                                                    (9 × 1 = 9 weightage)

III. Answer any *five* questions. Each question carries a weightage of 2 :

   22  Explain the consequences of acid rain.

   23  The uncertainty in the position of an electron is $10^{-10}$ m. What is its uncertainty in velocity ? ($h = 6.6 \times 10^{-34}$ Js).

   24  Write note on green house effect.

25 Using the theory of hybridization, explain the variation in the bond angles of methane ethylene and acetylene.

26 What is significance of sodium potassium pump in living cells ?

27 What are systematic and random errors ?

28 What are redox indicators ? Give one example.

(5 × 2 = 10 weightage)

IV. Answer any *two* questions. Each question carries a weightage of 4 :

29 (a) Draw the molecular orbital energy diagram for oxygen molecule and predict its bond order and magnetic property.

(b) What are the limitations of Bohr atom model ?

30 Mention the different type of errors in analytical determination. What are the methods for the reduction of such errors ?

31 What is hard water ? Discuss different methods for the removal of hardness of water.

(2 × 4 = 8 weightage)