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 × 3 = 24 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 6.6×10^{-17} kg moving with a kinetic energy 7.425×10^{-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.

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

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

9. 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.

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

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2020

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

(2019 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A (Short Answers)

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

1. How does inferential approach differ from experimental approach in research ?

2. List out the major international publishers in chemical sciences.

3. What is PPE ? What are the general contents in it ?

4. Distinguish between mean and median.

5. What are the major limitations of the HSAB concept ?

6. Compare the relative basic character of alkali metal hydroxides with alkaline earth metal hydroxides.

7. Why is Borazine named as inorganic Benzene ?

8. Draw the structure of $AlCl_3$ and substantiate its acidic character.

9. How is electronegativity assessed by Pauling's scale ?

10. State Fajan's rule.

11. What is Group displacement law ?

12. How do radioactive tracers help to study the reaction mechanism of ester hydrolysis ?

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

Turn over

Section B (Paragraph)

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

13. Describe the hypothesis - experiment - theory route of scientific method ?

14. Calculate the : (a) Normality ; and (b) Molarity of sulphuric acid solution prepared by dissolving 13.3 mL of sulfuric acid in 500 mL water (specific gravity for concentrated sulfuric acid is about 1.84 g/mL).

15. Distinguish between iodometric and iodimetric titrations with suitable examples.

16. Discuss the Lux-Flood and Usanovich concepts of acids and bases with suitable examples.

17. Describe the preparation methods of B_2H_6 and explain its structure.

18. Write a note on Carbon dating.

19. Define ionization energy and electron affinity. Comment on the horizontal and vertical trends.

(5 × 5 = 25 marks)

Section C

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

20. Write an essay on safe laboratory practices and simple first aids which can be followed in an undergraduate chemistry laboratory.

21. (a) Explain the gaseous diffusion method and thermal diffusion method of separation of isotopes ; (b) Write a brief note on the oxides of N.

(1 × 11 = 11 marks)

FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION NOVEMBER 2020

(CUCBCSS)

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

Time : Three Hours

Maximum : 80 Marks

Section A (One Word)

Answer **all** *questions.*

Each question carries 1 *mark.*

1. Name a base that can be used as a primary standard.

2. Electronic configuration of Cu^+ is ————.

3. An indicator that can be used in weak acid strong base titrations is ————.

4. Number of orbitals possible for $n = 3$ is ————.

5. Write one example of a radioactive isotope used in agriculture.

6. The disintegration constant of a radioactive element with half-life period 100's is ————.

7. Atoms having different mass number and same atomic numbers are called ————.

8. If 1 mol is present in 1 L, then 0.2 mol is present in ———— ml.

9. The first organic compound synthesized was ————.

10. Equivalent weight of oxalic acid is ————.

(10 × 1 = 10 marks)

Section B (Short Answers)

Answer any **ten** *questions.*

Each question carries 2 *marks.*

11. State group displacement law.

12. What is the principle behind iodometric titration ?

13. What do you mean by radioactive equilibrium ?

14. State Ritz-combination principle.

Turn over

15. Define normality and molarity.

16. Name two interdisciplinary areas of chemistry with physics.

17. Suggest treatment you would adopt for burns due to phenol.

18. State Heisenberg's uncertainty principle.

19. Give an example each for internal and external indicators.

20. Define Hypothesis.

21. What do you mean by black body radiation ?

22. 100 g of a radioactive substance is reduced to 25 g in 24 minutes. What is the half-life of the substance ?

(10 × 2 = 20 marks)

Section C (Paragraph)

Answer any **five** *questions.*
Each question carries 6 marks.

23. Explain the separation technique of isotopes by gaseous diffusion method and thermal diffusion method.

24. Distinguish between nuclear fission and nuclear fusion reactions.

25. In which regions of visible spectra do the five lines of hydrogen spectrum appear ? Give Rydberg's equation and explain the terms. An electron in the hydrogen atom undergoes transition from $n = 2$ to $n = 5$ state. Calculate the wavelength of light absorbed during the transition.

26. Write short notes on : (a) R and S phrase ; and (b) MSDS.

27. Differentiate between scientific evidence and scientific proof.

28. Explain the first aid management for accidents arising from electric shock, fire and inhalation of poisonous gases.

29. Explain the principle of permanganometry titrations using an example.

30. What is artificial radioactivity ? Illustrate with suitable examples.

(5 × 6 = 30 marks)

Section D (Essays)

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

31. (a) What are the postulates of Bohr Theory ? ; (b) Using Bohr's postulates, derive expression for the velocity of electron moving in the nth orbit of a hydrogen atom ; (c) If the energy of the electron of hydrogen atom in its nth orbit is given by $E = \dfrac{-13.6}{n^2}\ ev,$ find the ionization energy of hydrogen atom.

32. Discuss the principle and advantages of double burette titrations. Illustrate with an example.

33. Explain the significance of the various components of a research project.

34. Discuss the factors that affect nuclear stability.

$(2 \times 10 = 20$ marks$)$

FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION NOVEMBER 2020

(CUCBCSS)

Chemistry

CHE 1C 01—GENERAL CHEMISTRY

Time : Three Hours

Maximum : 64 Marks

Section A (One Word)

Answer all questions.
Each question carries 1 mark.

1. What is the shape of XeF_2 ?

2. Covalent radius of hydrogen atom is ————.

3. P subshell can have ———— possible orientation.

4. Number of moles of solute dissolved per litre of solution is called ————.

5. Heavy water acts as ———— in nuclear reactions.

6. What is the % of activity that remains after 4 years, if the half life of cobalt 60 is 5.26 year.

7. The phenomenon of radioactivity was discovered by ————.

8. Which indicator is used for the titration of weak acid against strong base ?

9. Solubility of $PbCl_2$ in water can be reduced by the addition of ————.

10. ———— is used as an indicator in complexo-metric titration.

(10 × 1 = 10 marks)

Section B (Short Answers)

Answer any seven questions.
Each question carries 2 marks.

11. What is equivalent mass ?

12. Write a note on Lewis acid-base concept.

13. Write the differences between accuracy and precision.

14. Define common ion effect.

15. What are isotones ? Give one example.

16. What is LCAO ?

Turn over

17. Write the principle of atomic bomb.

18. Explain rock dating with example.

19. How oxygen is transported in human body ?

20. What is the role of zinc in human body ?

(7 × 2 = 14 marks)

Section C (Paragraph)

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

21. Explain Pauling scale of electro-negativity.

22. State and explain modern periodic law.

23. Differentiate between Aufbau principle and Paulis exclusion principle.

24. Write the theory of volumetric analysis.

25. Explain sp^3d^2 and sp^3d^3 hybridisation with example.

26. How N/P ratio is related to nuclear stability ?

(4 × 5 = 20 marks)

Section D (Essays)

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

27. Explain the terms : (i) Ionisation enthalpy ; (ii) Electron affinity ; (iii) Electronegativity ; (iv) Mole fraction.

28. Give an account of : (i) Microanalysis ; (ii) Complexo-metric titration ; (iii) Indicators ; and (iv) Redox titration.

29. Draw the MO level diagram of N2 and CO and explain their properties.

30. Explain the principle and working of nuclear reactors.

(2 × 10 = 20 marks)

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Name...

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

FIRST SEMESTER (CBCSS-UG) DEGREE EXAMINATION NOVEMBER 2021

Chemistry

CHE 1C 01—GENERAL CHEMISTRY

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answers)

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

1. What is primary standard in volumetric analysis ? Give an example

2. Calculate the velocity of beam of electrons if they display de Broglie wavelength of 20 A^0.

3. What is the shape and bond angle of IF_7 molecule ?

4. What are dipole-dipole forces ? Give an example.

5. What is called as breeder reactor ?

6. Explain term mass defect.

7. Explain one use of radioisotopes in medical diagonosis.

8. Name a metalloporphyrin and metal present in it.

9. Give names of two iron storing proteins.

10. Name two elements considered as bulk elements in biochemistry.

11. What is the role of chlorophyll in photosynthesis ?

12. What is the role of haemoglobin in transport of O_2 ?

(Ceiling of Marks : 20)

Section B (Short answer)

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

13. Explain term microanalysis with suitable example and mention the advantages.

14. What are complexometric titrations ? Explain with reference to EDTA titration with its structure.

Turn over

15. Draw and explain Born-Haber cycle of NaCl.

16. How does the concept of hybridization explain geometry of acetylene molecule ?

17. Write short note on nuclear exchange forces.

18. Calculate age of uranium mineral that contains 0.2g of ^{206}Pb per gram of ^{238}U. Half-life of ^{238}U = 4.5×10^9 years.

19. Discuss photosynthesis.

(Ceiling of Marks : 30)

Section C (Essay)

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

20. Discuss theory of acid-base indicators.

21. (a) Discuss Limitations of Bohr atom model.

 (b) State and explain Heisenberg's uncertainty principle. What is its significance in our daily life ?

 (c) Calculate uncertainty in velocity of particle of mass 1×10^{-6} Kg whose uncertainty in position is 9.54 A^0.

($1 \times 10 = 10$ marks)

D 13577

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Name..

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FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2021

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

(2019—2020 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A (Short Answers)

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

1. What is meant by scientific theory ?

2. Give two examples each of behavior science and social science.

3. Explain and illustrate term precision with regard to analytic result.

4. What is the correct procedure for diluting a concentrated acid ?

5. Explain term ionization energy.

6. How does electronegativity vary along a period ? Explain its trend in periodic table.

7. What are hard acids ?

8. What is the relation between N/P ratio and nuclear stability ?

9. How will you find out the percentage of ionic character ?

10. Draw the structure of boric acid.

11. How is ^{14}C formed in the atmosphere ? How does it decay ?

12. Explain term isotope with suitable example.

(Ceiling of marks : 20)

Section B (Short Answer)

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

13. What are characteristics of a well-designed scientific experiment ?

14. What are the rules followed by handling chemicals ?

Turn over

15. Distinguish primary and secondary standard as applied to volumetry.

16. Discuss basic features of Pauling's scale of electronegativity.

17. Discuss slater rule and its application.

18. Explain the principle of Astons mass spectrograph.

19. Define and illustrate Usanovich concept of acid and base and its trends in periodic table

(Ceiling of marks : 30)

Section C (Essay)

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

20. (a) Discuss the role and function of redox indicators in dichrometric titration.

     (b) Explain terms permanganometry and dichrometry.

21. Compare the electron affinity and ionization energy of s and p block elements. Explain the structure of oxides of N and P.

(1 × 10 = 10 marks)

D 12618

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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.

    $[h = 6.6 \times 10^{-34}$ 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 π-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 × 3 = 24 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 × 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 × 11 = 11 marks)

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

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

(2021 Admissions)

Time : Two Hours   Maximum : 60 Marks

Section A (Short Answers)

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

1. What is meant by scientific observation ?

2. Name four branches of chemistry.

3. Explain and illustrate term accuracy with regard to analytic result.

4. What is a dessicant ? Give an example.

5. Explain term electron affinity.

6. Explain and draw atomic radius and covalent radius.

7. What are soft acids ?

8. Explain lux flood definition of acid and base.

9. Define dipole moment and what is its expression and unit.

10. Draw the structure of borazine.

11. Explain one use of radioisotopes in medical diagnosis.

12. What is mass defect ?

(8 × 3 = 24 marks)

Section B (Short Essays)

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

13. Explain and discuss criteria for scientific hypothesis.

14. Write short note on lab safety practices.

Turn over

15. What are characteristics that a primary standard should possess ?

16. Discuss basic features of Pauling's scale of electronegativity.

17. Explain Lowry Bronsted theory of acids and bases. Compare relative strength of conjugate acid and base.

18. The masses of $^{40}Ca_{20}$ atom, $^{1}H_{1}$ and $^{0}n_{1}$ are 39.975 amu, 1.0078 and 1,0086 amu. Calculate binding energy per nucleon for Ca atom.

19. State and illustrate group displacement law.

(5 × 5 = 25 marks)

Section C (Essay)

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

20. Define and explain the principle behind use of adsorption indicators.

21. What is Born-Haber cycle ? Discuss with respect to NaCl.

(1 × 11 = 11 marks)

FIRST SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION NOVEMBER 2021

Chemistry

CHE 1C 01—GENERAL CHEMISTRY

(2016—2018 Admissions)

Time : Three Hours

Maximum : 64 Marks

Section A (One word)

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

1. State The de-Broglie equation.

2. The azimuthal quantum number l = 0 indicates ——————— orbital.

3. What is the hybridisation of ethylene ?

4. Write the electronic configuration of oxygen.

5. Becqural is a unit of ———————.

6. ——————— isotope is used for the treatment of cancer.

7. ——————— is used as an indicator incomplexometrictitration using EDTA.

8. Iron containing oxygen transport metalloprotein in red blood cells is ———————.

9. What is the shape of ammonia molecule.

10. Hydrogen bomb is based on ——————— principle.

(10 × 1 = 10 marks)

Section B (Short answer)

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

11. What is ionic radii ?

12. What is electron gain enthalpy ?

13. Differentiate between acidimetry and alkalimetry.

Turn over

14. Give any two applications of complexometric titrations are useful.

15. State Heisenberg uncertainty principle.

16. Define lattice energy and what is its significance.

17. How are mass defect and nuclear stability related ?

18. Define the term binding energy.

19. Differentiate between nuclear fission and fusion.

20. What is co-ordinate bond ?

(7 × 2 = 14 marks)

Section C (Paragraph)

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

21. Define molality, molarity and normality.

22. Write the differences between Arrhenius theory and Lowrybronsted theory for acids and bases.

23. Write the principle involved in the separation of cations in qualitative analysis.

24. Write the mechanism of sodium potassium pump.

25. Explain photosynthesis in plants.

26. Give an account of different modes of nuclear decay.

(4 × 5 = 20 marks)

Section D (Essay)

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

27. Give an account of the applications of common ion effect and solubility product in qualitative analysis.

28. What are the postulates of VSEPR theory ? Explain the shape of BF_3 and PCl_5.

29. Discuss the applications of radioactive isotopes.

30. Explain the structure and functions of haemoglobin and myoglobin.

(2 × 10 = 20 marks)

D 12481

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Name...

Reg. No...

FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

(2016—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A (One Word)

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

1. ——————— is an indicator used in iodimetry.

2. EDTA is ———————.

3. Electronic configuration of Cr is ———————.

4. Number of orbitals possible for $n = 4$ is ———————.

5. Reciprocal of decay constant is called ———————.

6. What is the volume of 0.2 mole of SO_2 at STP ?

7. Give an example of primary standard.

8. An example of radioisotope used in medicine is ———————.

9. ——————— is an interdisciplinary area of chemistry involving physics.

10. Equivalent weight of H_2SO_4 is ———————.

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

Section B (Short Answer)

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

11. Name the four radioactive series.

12. Calculate the number of α and β particles emitted when ^{232}Th gets converted to ^{208}Pb.

Turn over

13. What is radioactive equilibrium ?

14. State Hund's rule of maximum multiplicity with an example.

15. Find the molarity of a solution prepared by dissolving 50 g of NaOH in 100 ml water.

16. What is photoelectric effect ?

17. Suggest treatment you would adopt for burns due to bromine.

18. What do you mean by wave particle duality ? Who proposed it ?

19. Differentiate between isotopes and isobars with example.

20. Define Hypothesis.

21. Give an example each for internal and external indicators.

22. What is artificial radioactivity ? Give an example.

(10 × 2 = 20 marks)

Section C (Paragraph)

Answer any **five** *questions.*
Each question carries 6 marks.

23. Discuss the concept of n/p ratio, mass defect and binding energy and explain how they influence the stability of a nucleus.

24. Briefly explain the principle and working of nuclear reactors.

25. State Heisenberg's uncertainty principle. Calculate the uncertainty in the velocity of a wagon of mass 1000 kg, whose position while in motion is known to an accuracy of ± 10 m (h = 6.6 × 10^{-34} kg m^2 s^{-1}).

26. Write short notes on (a) R and S phrase ; and (b) MSDS.

27. Explain the first aid management for accidents arising from electric shock, fire and inhalation of poisonous gases.

28. Discuss the various objectives of a chemical research.

29. State and explain the principle of permanganometry titrations. Illustrate with an example.

30. Define the following (a) Molarity ; (b) Normality ; and (c) Mole fraction.

31. Explain C-14 dating. A fresh sample of wood gives a radioactivity of 20 disintegrations per minute, whereas an old sample of wood gives one disintegration per minute. Calculate the age of the sample. Half-life period of ^{14}C is 5760 years.

32. Differentiate between scientific evidence and scientific proof.

(5 × 6 = 30 marks)

Section D (Essay)

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

33. Discuss the various applications of radioactive isotopes.

34. Explain the principle behind (a) Acid-base ; (b) Complexometric ; and (c) Redox indicators.

35. Give the postulates of Bohr theory of atom. Based on this, explain in detail the atomic spectra of hydrogen.

36. Discuss the principle and advantages of double burette titration. Illustrate with an example.

(2 × 10 = 20 marks)