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(Pages: 2)

Name	•••••

Reg. No.....

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 AlCl₃ 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?

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

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 B₂H₆ and explain its structure.
- Write a note on Carbon dating.

. ..

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

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

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.

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

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(Pages: 3)

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Reg. No.....

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 ———.

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

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.

- 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?

 $(10 \times 2 = 20 \text{ marks})$

Section C (Paragraph)

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

- 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,

 $(5 \times 6 = 30 \text{ marks})$

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 n^{th} orbit of a hydrogen atom ; (c) If the energy of the electron of hydrogen atom in its n^{th} orbit is given by $E = \frac{-13.6}{n^2}$ 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.

 $(2 \times 10 = 20 \text{ marks})$

(Pages: 2)

Name.....

Reg. No. Ki

FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CBCSS-UG)

Chemistry

CHE 1B 01-THEORETICAL AND INORGANIC CHEMISTRY-I

(2019 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 hypothesis?
- What is meant by a research design?
- How many significant digits are there in each of the following reported values, (a) 5400 ml
 (b) 0.00086 g.
- 4. What is the purpose of fume cupboards in laboratory?
- 5. Define term binding energy of nucleus and binding energy per nucleon. How is it related to stability of nucleus?
- State group displacement law.
- .7. Describe Mullikens approach of electronegativity.
- 8. State and explain modern periodic law.
- 119. The ionic radius of K+ is smaller than that of Cl- even though they are isoelectronic. Why?
- 10. Write a note on inert pair effect.
- 11. Explain Lowry-Bronsted and Lewis concepts of acids and bases.
- 12, Distinguish hard and soft acid and bases.

(Ceiling of marks: 20)

Section B (Short answer)

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

- 13. What are the criteria for scientific statements?
- Calculate mean and standard deviation of following measurements for concentration of lead in ppm found in replicate analysis of sample blood. 0.751, 0.752, 0.756, 0.760.

 Turn over

- 15. What are complexometric titrations? Explain with reference to EDTA titration.
 - Define ionization enthalpy and electron affinity. State how they vary down a group of periodic table.
 - 117. Explain term diagonal relationship. Discuss with example. Illustrating the similarities in properties.
 - 18. Describe structure, properties and applications of diborane.
 - 19. State SAB principle? Mention its application.

(Ceiling of marks: 30)

Section C (Essay)

Answer any one question. Each question carries 10 marks.

- 20. Discuss the theory of acid base indicators.
- 21. (a) Distinguish between terms nuclear fission and nuclear fusion.
 - (b) Give methods of separation of isotopes.

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

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C 33295	(Pages: 3)	Name
		Reg. No
FIRST SEMESTER B.Sc	DEGREE EXAMINAT	TION, NOVEMBER 2017
	(CUCBCSS—UG)	
	Chemistry	
CHE 1B 01—THEO	RETICAL AND INORGAN	IIC CHEMISTRY—I
Time: Three Hours		Maximum: 80 Marks
	Section A	
A_{7}	nswer in one word or sentence Answer all questions.	e.
1. Name one interdisciplinary ar	ea of science involving chemis	stry and physics.
2. Define atomic mass unit.		
3. Equivalent mass of an oxidant	t = .	
4. Define mole fraction of a comp	ponent in solution.	
5. The number of moles in 14g of	f CO is ———.	
6. Name one adsorption indicator		
7. Square root of variance is call	ed	
8. Paschen series of spectral line	s occurs in the ——— reg	ion of electromagnetic spectrum.

9. State Planck's quantum theory.

10. Radioactive decay follows ———— order kinetics.

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

Section B

Answer any ten questions. Each carries 2 marks.

- 11. What is meant by a scientific theory?
- 12. Calculate the absolute mass of one atom of Oxygen (O = 16).
- 13. What are the mole fraction of the components in a solution containing 4moles of ethanol, 1 mole of acetic acid and 5moles of water.

- 14. What are isobars? Explain with examples.
- 15. Name one acid-base indicator and one metal ion indicator.
- 16. Name two desiccants used in desiccators.
- 17. What are primary standards in volumetric analysis? Give one example.
- 18. Calculate the momentum of a particle having a de broglie wavelength of $10A^{\circ}$ (h = $6.626 \times 10^{-34} J_s$).
- 19. Calculate the uncertainty in the position of a particle whose uncertainty in momentum is $2 \times 10^{-2} \text{ kg m s}^{-1}$
- 20. Explain the term 'artificial radioactivity' with a suitable example,
- 21. The half life period of a radionuclide is 2.4 minutes. Calculate its decay constant.
- 22. Explain the nuclear fission chain reaction.

 $(10 \times 2 = 20 \text{ marks})$

Section C

Answer any five questions. Each carries 6 marks

- 23. Distinguish between scientific theories and laws.
- 24. Define the concentration terms molality, molarity and mass percentage. Calculate the molality of a 10% solution of NaOH.(Na = 23, O = 16, H = 1).
- 25. Explain the significance of material safety data sheets of chemicals.
- 26. What are complexometric titrations? Explain with special reference to EDTA titrations.
- 27. Distinguish between:
 - (i) Accuracy and precision.
 - (ii) Equivalence point and end point.
- 28. Discuss the Heisenberg's uncertainty principle. Explain its significance.
- 29. State and explain the phenomenon photoelectric effect.
- 30. Explain the applications of tracers.

Section D

Answer any two questions. Each carries 10 marks.

- 31. (a) Define the terms mole and molar volume. Calculate the number of molecules and number of mloles present in 10 L of CO₂ at 273K and 760mm.
 - (b) Distinguish between relative atomic mass and absolute mass of atom.
- 32. (a) Explain the theory of acid base indicators with examples.
 - (b) Calculate the de Broglie wavelength of an electron accelerated by a potential of 100 volts, $^{-1}$ (h = 6.626×10^{-34} Js, charge of electron e = 1.602×10^{-19} C and mass of electron = 9×10^{-31} kg)
- 33. (a) Explain the origin of line spectrum of hydrogen on the basis of Bohr's atomic theory

(b) What are the limitations of Bohr's atomic theory.

- 34. (a) Correlate N/P ratio and nuclear stability.
 - (b) Write a short note on nuclear reactor.

 $(2 \times 10 = 20 \text{ marks})$

D 12617	(Pages : 2)	Name
		Reg. No

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?

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

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.

2 **D 12617**

- 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.

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

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.

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

D 5	52727 (Pages: 3)	Name
		Reg. No
,	FIRST SEMESTER B.Sc. DEGREE EXAMINATIO	N, NOVEMBER 2018
	(CUCBCSS—UG)	
	Core Course (Chemistry)	
	CHE 1B 01—THEORETICAL AND INORGANIC	CHEMISTRY—I ·
	(Common with Polymer Chemistry and Industr	ial Chemistry)
lime	e: Three Hours	Maximum: 80 Marks
	Section A	
	Answer in one word or sentence. Answer all qu estions. Each question carries 1 mark.	
1.		
2.	2. The oxidation number of Mn in MnO_4^- ion is ———.	
3.	3. 200g of a 10% (w/w) aqueous solution of glucose contains——	grams of glucose.
4.	4. The mass of Avogadro number of hydrogen atoms is ————	kg.
5.	5. Eriochrome Black T is used as an indicator in———— titratio	ons.
6.	6. The number of significant figures in a value reported as 5.0980	is
7.	7. Balmer series of spectral lines occurs in the ———— region of	electromagnetic spectrum.
8.	3. The wavenumber of a light with wave length 5×10^{-9} m is ——	
9.	The radiant energy of sun is due to nuclear ———.	
10.)series is called artificial radioactive disintegration se	eries.
		$(10 \times 1 = 10 \text{ marks})$
	Section B	
	Answer any ten questions. Each question carries 2 marks.	
11.	. What is meant by a scientific hypothesis?	•

12. Calculate the normality of a solution containing 40g of NaOH in 4L.

14. Name one metal ion indicator and one adsorption indicator.

13. What are isotopes? Explain with examples.

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- 15. What are dessicants? Give one example.
- 16. What is a primary standard in volumetric analysis? Give one example.
- 17. Calculate the energy of a radiation having a wavelength of 1000A° (h = 6.626×10^{-34} Js).
- 18. What is photoelectric effect?
- 19. Write any four limitations of Bohr theory.
- 20. State Geiger Nuttal rule.
- 21. Explain the term packing fraction.
- 22. Explain K electron capture with an example.

 $(10 \times 2 = 20 \text{ marks})$

Section C

Answer any five questions. Each question carries 6 marks.

- 23. Distinguish between the terms molarity, normality and molality.
- 24. Explain with examples the terms isotopes, isobars and isotones.
- 25. Write the abbreviation of MSDS. What is its significance?
- 26. Write the principles of iodometric and iodimetric titrations.
- 27. Discuss briefly the components of a research Project report.
- 28. What is meant by Bohr radius? Calculate the radius of the first. Bohr orbit of hydrogen atom. (h = $6.626 \times 10^{-34} Js$, $\epsilon_0 = 8.854 \times 10^{-12} C^2 m^{-1} J^{-1}$, e = $1.602 \times 10^{-19} C$ and mass of electron = $9 \times 10^{-31} kg$).
- 29. Derive the de Broglie relation.
- 30. Write a note on radiocarbon dating.

 $(5 \times 6 = 30 \text{ marks})$

Section D

Answer any two questions. Each question carries 10 marks.

- 31. (a) Define the terms mole and Avogadro number. Calculate (1) The number of molecules present in 22g of CO_2 . (2) The absolute mass of one molecule of CO_2 .
 - (b) Define the following terms of expressing concentration: weight percentage, normality, molefraction and ppm.

- 32. (a) Which indicator(s) can be used for titration of (1) oxalic acid vs NaOH (2) Na₂CO₃ vs HCl? Explain.
 - (b) What are the first aid treatments for a person who suffers (1) skin contact (2) eye contact with bromine?
- 33. (a) Write the important postulates of Bohr's atomic theory.
 - (b) Discuss the Davisson-Germer experiment on electron diffraction.
- 34. (a) Calculate the number of alpha and beta particles emitted during the disintegration of $_{92}\rm U^{235}$ to $_{82}$ Pb207.
 - (b) Write a note on nuclear fission.

 $(2 \times 10 = 20 \text{ marks})$

D 32343	(Pages : 2)	Name
		Dog No

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2022

Chemistry

CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I

(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. Distinguish between primary and secondary data.
- 2. Specify the major difficulties in the formulation of hypotheses.
- 3. What do the R and S phrases stand for?
- 4. Calculate the normality of oxalic acid solution prepared by dissolving 1.575g in 250 mL.
- 5. Ionization enthalpies of Be and N are higher than expected. Why?
- 6. What is the effective nuclear charge in a polyelectronic atom?
- 7. Briefly explain the inert pair effect with an example.
- 8. State Born Lande equation.
- 9. What is the Lux-Flood definition of acids and bases?
- 10. What are amphoteric oxides? Suggest a couple of examples.
- 11. Calculate the decay constant of a radioactive element decayed to its 10 % of initial amount in 10 days.
- 12. Comment on the stability of the nucleus considering the proton-proton electrostatic repulsion into account.

[Ceiling of marks: 20]

D 32343

Section B (Paragraph)

2

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

- 13. Briefly outline the essential components of a research publication?
- 14. Explain the double burette method of titration; what are its advantages over burette-pipette titration?
- 15. Write a note on the classification of errors.
- 16. Describe the Pauling and Mulliken scales of electronegativity.
- 17. Explain the principle behind flame tests shown by alkali metal ions.
- 18. Write a note on Pearson's HSAB concept.
- 19. Describe the gaseous diffusion method and thermal diffusion method of separation of isotopes.

(Ceiling of marks: 30)

Section C

Answer any **one** question.

The question carries 10 marks.

- 20. Explain the theory of: (a) Redox; and (b) Complexometric titrations.
- 21. (a) Illustrate Born Haber cycle; and (b) Discuss the use of radioactive isotopes tracers.

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

(Pages:	2)
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Name	

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(CUCBCSS-UG)

Core Course—Chemistry

CHE IB 01—THEORETICAL AND INORGANIC CHEMISTRY—I

Maximum: 80 Marks Time: Three Hours

Section A (One word/sentence)

Answer all questions.

	Each question carries 1 mark.
1.	A well-substantiated explanation of natural phenomena through observation by scientific method is called ————.
2.	The overall achievements of a research project are explained in a few sentences in ———————————————————————————————————
3.	Isotones are atoms of different elements with the same number of ————.
4.	The equivalent mass of a dibasic acid is ———— of its molecular mass.
5.	The oxidation number of Cr in $K_2Cr_2O_7$ is ————.
6.	What is the use of silica gel in desiccators?
7.	Number of significant figures in 1.000 and 0.0023, respectively are — and — and —
8.	The ———— experiment resulted in the development of Rutherford's atom model.
9.	Albert Einstein received the Nobel prize for the theoretical explanation of
0.	K-electron capture takes place during the conversion of ——————————————————————————————————

Section B (Short answer)

Answer any ten questions. Each question carries 2 marks.

- Name any two branches of modern chemistry.
- Justify the statement Falsification of hypothesis is an effective method in scientific research.
- Calculate the volume of 1.008 g of $H_{2\,(g)}$ at STP.
- 14. Calculate the normality of sodium carbonate solution, when 0.462g of anhydrous sodium carbonate is dissolved in 100 mL water.
- 15. Potassium dichromate is used as a primary standard but not Potassium permanganate. Why?
- 16. Write the importance of MSDS in chemistry laboratory.

- 17. Write the limitations of Rutherford model of atom.
- 18. Find out the wave number of $H\alpha$ line of Balmer series of hydrogen spectrum.
- 19. What is group displacement law?
- 20. In permanganometric titrations dil. $\rm H_2SO_4$ is used to acidify the oxalic acid/Fe²⁺ solution and not dil HCl. Why?
- 21. How will you explain the emission of β -rays from nucleus?
- 22. Why neutrons are better particles for artificial transmutation than α particles?

Section C (Paragraph)

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

- 23. Identify and discuss any *two* areas in biology where the knowledge in chemistry is essential for its easy study.
- 24. Suggest first aids for:
 - (i) inhalation of poisonous gases
 - (ii) burns due to phenol
 - (iii) electric shock.
- 25. Discuss the theory of redox indicators.
- 26. What is meant by wave-particle duality? Derive de Broglie's relation for the wave particle dual nature of electron.
- 27. The density of a 20% (w/w) aqueous solution of Kl (m = 166) is 1.2gcm⁻³. Calculate the molarity and molality of the solution.
- 28. Nuclear fission can result in explosion. How is it controlled in nuclear reactors? What is the principle of hydrogen bomb?
- 29. State and explain Hasienbergs's uncertainty principle.
- 30. Write briefly on C14 dating.

Section D (Essay)

Answer any two questions. Each question carries 10 marks.

- 31. Discuss research design with a suitable example elaborating the different components of research project.
- 32. There is a recent trend in adopting double burette method of titration for quantitative analysis. Discuss the utility of this method emphasising the principle and advantages.
- 33. Write the merits and demerits of Bohr model of atom. Explain the origin of different series of lines in hydrogen spectrum using Bohr model of atom.
- 34. Discuss the principle and applications of Aston's mass spectrograph. Write any *one* method used for the enrichment of uranium.

\mathbf{D}	13	8793 (Pages: 2) Name
	_	(Tages . 2)
		Reg. No
	F	TRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016
		(CUBCSS-UG)
		Chemistry
,		CHE 1B 01—THEORETICAL AND INORGANIC CHEMISTRY—I
Tin	ne : '	Three Hours Maximum: 80 Marks
		Section A (One Word/Sentence)
		Answer all questions.
		Each question carries 1 mark.
	1.	A medieval chemical science and speculative philosophy aiming to achieve the transmutation of base metals into gold is known as ———.
	2.	Scientific data can be represented by using:
		(a) Tables; (b) Graphs; (c) Diagrams; (d) All of these.
	3.	The molar volume of an ideal gas at STP is ———.
	4.	The oxidation state of Cr in CrO_4^{2-} is ———.
	5.	Titrations involving iodine liberated in chemical reactions are called ———.
	6.	The solution of a substance with accurately known strength is called ———.
	7.	What is Rydberg constant?
•	8.	The dual nature of matter was proposed by ———.
	9.	The steady-state reached by the members of a radioactive series is called ———.
:	10.	What is average life period?
•		$(10 \times 1 = 10 \text{ marks})$
· . · ,		Section B (Short Answers)
		Answer any ten questions. Each question carries 2 marks.
	11.	Differentiate scientific theories and laws.
	12.	What is meant by formulation of hypothesis?
	13.	What are the disposal techniques of broken mercury thermometer?
	14.	Distinguish isotope and isobar with an example for each.

15. What are adsorption indicators? Give two examples.

16. State any two advantages of double burette method of titration.

- 17. What are significant figures? How many significant numbers are there in 3.040?
- 18. State and formulate Heisenberg's uncertinty principle.
- 19. How did Sommerfeld modify Bohr theory?
- 20. Explain the theory of radioactive disintegration.
- 21. What is Gieger-Nuttal rule?
- 22. Complete the following nuclear reactions:
 - (a) $_{7}N^{14} + ? \rightarrow {}_{6}C^{14} + {}_{1}H^{1}$
 - (b) $_{25}\text{Mn}^{55} + _0\text{n}^1 \rightarrow ? + \gamma$

 $(10 \times 2 = 20 \text{ marks})$

Section C (Paragraphs)

Answer any five questions. Each question carries 6 marks.

- 23. Give an account of various branches in modern Chemistry.
- 24. Define (i) mole fraction; (ii) molarity; (iii) normality; and (iv) molality.
- 25. State Ritz combination principle. Calculate the wavelength of an electron having mass 9×10^{-31} kg., moving with a velocity 10 % that of light.
- 26. Explain (i) Planck's quantum hypothesis and (ii) Photoelectric effect.
- 27. Write a short note on (i) MSDS and (ii) R & S Phrases.
- 28. Discuss the titration curves for the neutralization of (i) Strong acid × strong base; (ii) Strong acid × weak base.
- 29. Explain the principle of Aston's mass spectrograph.
- 30. Describe radiocarbon dating. The 14 C/ 12 C ratio in a piece of wood is 14 % that of the atmosphere. Calculate the age of the wood ($t_{1/2}$ of 14 C = 5760 years).

 $(5 \times 6 = 30 \text{ marks})$

Section D (Essays)

Answer any two questions. Each question carries 10 marks.

- 31. (a) Write briefly on Bohr atom model and its limitations.
 - (b) Discuss different series of lines in H-spectrum.
- 32. (a) Describe any one method for the separation of isotopes.
 - (b) Explain with examples how radio isotopes are useful in radio diagnosis and radiotherapy.
- 33. What are complexometric titrations? Discuss briefly the theory of metallochromic indicators.
- 34. Write a brief note on the various components of a research project.

 $(2 \times 10 = 20 \text{ marks}).$

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FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

(CUCBCSS-UG)

Core Course—Chemistry

CHE IB 01—THEORETICAL AND INORGANIC CHEMISTRY—I

Time: Three Hours

Maximum: 80 Marks

Section A (One word/sentence)

Answer all questions.

Each question carries 1 mark.

Section B (Short answer)

Answer any ten questions. Each question carries 2 marks.

- 11. Name any two branches of modern chemistry.
- 12. Justify the statement Falsification of hypothesis is an effective method in scientific research.
- 13. Calculate the volume of 1.008 g of $H_{2(g)}$ at STP.
- 14. Calculate the normality of sodium carbonate solution, when 0.462g of anhydrous sodium carbonate is dissolved in 100 mL water.
- 15. Potassium dichromate is used as a primary standard but not Potassium permanganate. Why?
- 16. Write the importance of MSDS in chemistry laboratory.

- 17. Write the limitations of Rutherford model of atom.
- 18. Find out the wave number of Hα line of Balmer series of hydrogen spectrum.
- 19. What is group displacement law?
- 20. In permanganometric titrations dil. $\rm H_2SO_4$ is used to acidify the oxalic acid/Fe²⁺ solution and not dil HCl. Why?
- 21. How will you explain the emission of β-rays from nucleus?
- 22. Why neutrons are better particles for artificial transmutation than α particles?

Section C (Paragraph)

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

- 23. Identify and discuss any two areas in biology where the knowledge in chemistry is essential for its easy study.
- 24. Suggest first aids for:
 - (i) inhalation of poisonous gases
 - (ii) burns due to phenol
 - (iii) electric shock.
- 25. Discuss the theory of redox indicators.
- 26. What is meant by wave-particle duality? Derive de Broglie's relation for the wave particle dual nature of electron.
- 27. The density of a 20% (w/w) aqueous solution of Kl (m = 166) is 1.2gcm⁻³. Calculate the molarity and molality of the solution.
- 28. Nuclear fission can result in explosion. How is it controlled in nuclear reactors? What is the principle of hydrogen bomb?
- 29. State and explain Hasienbergs's uncertainty principle.
- 30. Write briefly on C14 dating.

Section D (Essay)

Answer any two questions.

Each question carries 10 marks.

- 31. Discuss research design with a suitable example elaborating the different components of research project.
- 32. There is a recent trend in adopting double burette method of titration for quantitative analysis. Discuss the utility of this method emphasising the principle and advantages.
- 33. Write the merits and demerits of Bohr model of atom. Explain the origin of different series of lines in hydrogen spectrum using Bohr model of atom.
- 34. Discuss the principle and applications of Aston's mass spectrograph. Write any *one* method used for the enrichment of uranium.