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Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS-UG)

Chemistry

CHE 5B 06—INORGANIC CHEMISTRY—III

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- Which is the most common isotope of Hydrogen?
- 2. Diborane on hydrolysis yields —
- 3. Formula of Bleaching powder is —
- 4. Example of an Orthosilicate is —
- 5. Silicon rubbers are also known as
- 6. Maddrell's salts are polymetaphosphates of
- 7. The element which consume a pollutant are known as
- 8. Formula of Paraperiodic acid is ————
- 9. Name a green house gas.
- Structure of AlCl₃ is ———.

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. Discuss the structure of Diborane.
- 12. Beryllium shows covalency whereas other members of the family show electrovalency.
- 13. Write S.N. on BOD.
- 14. Define solubility product with an example.
- 15. Give a brief description of oxoacids of Nitrogen.
- 16. Name the Halogens and give their electronic configuration.
- 17. Discuss the structure of ClF₃.

- 18. How is XeF₄ prepared?
- 19. How would you account for the different colours produced by alkaline earth metals in the Bunsen flame?
- 20. Explain the term polarisation of an anion.
- 21. Discuss the variation of oxidation states of elements as we move from left to right in a period.
- 22. What are Pseudohalides?

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

Section C

Answer any five questions. Each question carries 6 marks.

- 23. Discuss the general trends in Group I with respect to:
 - (i) Melting point.

- (ii) Density.
- (iii) Ionisation energy.
- (iv) Atomic and Ionic radii.
- 24. Write SN on co-precipitation.
- 25. How are determinate and indeterminate errors classified? How are they detected and corrected?
- 26. Discuss the gradation in properties of elements of group 13 with respect to (a) electron affinity; (b) metallic character.
- 27. What are Carbides? How do we classify them?
- 28. What is thermal pollution?
- 29. What are the limitations of liquid ammonia as solvent?
- 30. What is meant by the terms-sample, sample population and population mean? How are sample mean and population mean determined?

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

Section D

Answer any two questions. Each question carries 10 marks.

31. (a) What is Smog? What is the difference between classical smog and photochemical smog? What are the adverse effects of photochemical smog?

(6 marks)

(b) Write S.N. on green house effect.

(4 marks)

			D 50613
32.	(a)	What is Inert pair effect? Discuss.	(4 marks)
	(b)	What are Carboranes? How are Carboranes classified?	(6 marks)
33.	(a)	What are the advantages and disadvantages of liquid SO ₂ as solvent?	(4 marks)
	(b)	What are the advantages and disadvantages of liquid NH3 as solvent?	(4 marks)
	(c)	What do you understand by Ionising and non-ionising solvents? Give examples.	
			(2 marks)
34.	(a)	Write S.N. on anomalous behavior of oxygen.	(4 marks)
	(h)	Compare and contrast properties of Aluminium and Beryllium	(6 marks)

 $[2 \times 10 = 20 \text{ marks}]$

D 70	0214	(Pages: 2)	Name
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)	FIFTH SEMESTER B.Sc. DE	GREE EXAMINAT	TON, NOVEMBER 2015
		CUCBCSS-UG)	
		Chemistry	
	CHE 5B 06—II	NORGANIC CHEMIST	RY—III
Time:	: Three Hours	.,	Maximum: 80 Marks
	. Times riours	Section A	
		swer all questions. uestion carries 1 mark.	
1.	The element with the electronic conf	iguration 1s ² 2s ² 2p ⁶ 3s ² p ⁶	$^{\delta}d^{10}4s^{1}$ belongs to ——— block.
2.			
3.			 .
4.	25 . 1: 1:1:		
5.			
6.	An example of green house gas is —	•	And the second s
7.	An example of Ortho Silicate is ——	 .	
8.	Formula of Bleaching powder is —	 .	
9.	Fullerenes are allotropes of Carbon l	naving the general form	ula ———.
10.	Solid Carbon dioxide is commonly kn	own as ———.	
		• ••	$(10 \times 1 = 10 \text{ marks})$
		Section B	
		er any ten questions. estion carries 2 marks.	
11.	What are Inorganic polymers?		
12.	Define (a) Pollution; (b) Pollutant.		
13.	Cu (II) is precipitated as CuS in dil. HO medium. Why?	Cl medium, while Co (II) i	s precipitated as CoS in ammoniacal
14.	What are the adverse effects of Cadm	ium as water pollutant	?
15.	Define Allotropy.		
16.	What are Pseudohalides?		

- 17. Explain the geometry of IF₅.
- 18. Define solubility product with an example.
- 19. Name any two applications of NH₃.
- 20. Name any two uses of Boron.
- 21. How does Ortho Hydrogen differ from para Hydrogen?
- 22. What are Ionising and non-ionising solvents?

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

Section C

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

- 23. Differentiate between accuracy and precision.
- 24. What are the uses of noble gases?
- 25. Discuss the role of Selenium in Xerography.
- 26. What is levelling effect?
- 27. What are Clathrate compounds of Noble gases?
- 28. What is Thermal pollution?
- 29. What are the limitations of liquid SO_2 as solvent?
- 30. What is Co-precipitation?

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

Section D

Answer any two questions. Each question carries 10 marks.

31.	(a)	How are Errors classified ? Explain.	(6 marks)
		Discuss briefly different types of sampling.	(4 marks)
32.		Write S.N. as Phosphazenes.	(5 marks)
-		How are Non-aqueous solvents classified? Explain with examples.	(5 marks)
33.		Compare the properties of halogens and pseudo halogens.	(5 marks)
		Write S.N. on electronegativity.	(5 marks)
34.		What is inert pair effect. Discuss.	(4 marks)
01.		What are Carboranes? How are Carboranes classified?	(6 marks)
	()		$[2 \times 10 = 20 \text{ marks}]$

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FIFTH SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS-UG)

Chemistry

CHE 5B 06-INORGANIC CHEMISTRY-III

Time : Three Hours

Maximum: 80 Marks

Section A (One Word)

Answer all questions. Each question carries 1 mark.

1	In inorganic qualitative analysis, group III cations are precipitated as the	ir
2		
3.		, and a series of product
4.	Write the order of density of alkali metals.	
5.	An aprotic nonaqueous solvent is ———.	
6.	Ozone hole was first noticed in 1979 in ———.	
7.	Rain made acidic by oxides of nitrogen and sulphur is called ———.	
8.	is an example of pseudohalogen.	
9.	Hybridization of iodine in IF ₅ is ———.	
10.	Among the hydrides of nitrogen highest bond angle is sown by ———.	
		$(10 \times 1 = 10 \text{ marks})$

Section B (Short Answer)

Answer at least five questions. Each question carries 4 marks. All questions can be attended. Overall Ceiling 20.

- Name the second group cations. How are they precipitated?
- Explain term accuracy with regard to analytical results.
- Comment about the hydration of alkali metals.
- What are ortho and para hydrogens?
- 15. Write autoionisation of SO₂.
- 16. Alkali metals in liquid ammonia are coloured. Why?
- Discuss the structure of (SN)x.

- 18. What are phosphazenes?
- 19. Write two control measures for water pollution.
- 20. What are different types of E-wastes?
- Arrange HClO, HClO $_2$, HClO $_3$ and HClO $_4$ in the increasing order of acidic strength. Give reason

 $(5 \times 4 = 20 \text{ marks})$

Section C (Paragraph)

Answer at least four questions. Each question carries 7.5 marks. All questions can be attended. Overall Ceiling 30.

- 22. A solution contains Cu²⁺ and Ba²⁺ ions. How would you separate the ions and identify
- 23. Explain term microanalysis with suitable example and mention the advantages.
- 24. Discuss the position of hydrogen in periodic table.
- 25. Discuss briefly preparation properties and structure of AICI3.
- Discuss general characteristics of ionizing solvent.
- 27. How are silicones prepared? Discuss structure and uses.
- 28. Write note on pollution control board, their duties and responsibilities.
- Discuss challenges in managing solid wastes.
- 30. Explain charcoal adsorption method for separation of noble gases.

 $(4 \times 7.5 = 30 \text{ marks})$

Section D (Essay)

Answer any two questions. Each question carries 10 marks.

- 31. Define with example: (a) Inert pair effect (b) Diagonal relationship (c) Catenation (d) Lewis acidity of boron halides (e) Ionization energy of Boron family.
- 32. Write note on liquid ammonia as non-aqueous solvent.
- 33. Write notes on : (a) Industrial effluents (b) Agriculture discharge (c) Quality of drinking water (d) Etrophication.
- 34. (a) Give the preparation properties and structure of oxides and oxyhalides of xenon.
 - (b) What are interhalogen compounds? How are they obtained? Give a note on their properties and structure.

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FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CUCBCSS-UG)

Chemistry

CHE 5B 06—INORGANIC CHEMISTRY - III

Time: Three Hours Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. Give two examples each of Ionic and Covalent Hydrides.
- 2. What are polyhalides? Give an example.
- 3. Define Accuracy.
- 4. Name two green house gases.
- 5. Draw the structure of Diborane.
- 6. What is levelling effect?
- 7. Name any two uses of Boric acid.
- 8. Draw the structure of SO₂.
- 9. What are Fullerenes?
- 10. Name two Lewis acids.

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

Section B

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

- 11. Differentiate between Ortho and Para Hydrogen.
- 12. Discuss briefly Amorphous Carbon.
- 13. Discuss solubility product with examples.
- 14. Discuss the uses of phosphates in analysis and industry.
- 15. Write S.N. on anomalous properties of Oxygen.
- 16. Compare the Lewis acidity of Boron halides.
- 17. Write S.N. on Alternate refrigerants.
- 18. Write S.N. on uses of Ozone.
- 19. How is Hydrogen peroxide prepared?

- 20. How is Nitric acid manufactured?
- 21. Write S.N. on Hazardous waste.
- 22. Discuss briefly COD.

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

Section C

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

- 23. Write S.N. on classification of errors. How are errors minimized?
- 24. Discuss in detail anomalous properties of Fluorine.
- 25. Write S.N. on acid rain.
- 26. Discuss the separation of nobles gases by charcoal adsorption method.
- 27. Discuss properties of Phosphazenes.
- 28. Discuss the diagonal relationship between Beryllium and Aluminium.
- 29. What are the adverse effects caused by toxic metals in water?
- 30. Write S.N. on thermal stability and solubility of carbonates.

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

Section D

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

- 31. (a) Discuss in detail co-precipitation and post-precipitation.
 - (b) Write S.N. on uses of Noble gases.

(5 + 5 = 10 marks)

- 32. (a) Compare the Ionization energy and metallic character of alkali and alkaline earth metals.
 - (b) Write S.N. on preparation, properties and uses of Borazine and Boron Nitride.

(6 + 4 = 10 marks)

- 33. (a) Write S.N. on structure and applications of Silicones and Silicates.
 - (b) Write S.N. on impacts of medical waste and their disposal.

(6 + 4 = 10 marks)

- 34. (a) Write S.N. on Minamata disaster and Chernobyl accident.
 - (b) Write S.N. on Eutrophication.
 - (c) Discuss the applications of solubility product and common ion effect in the precipitation of cations.

(4 + 2 + 4 = 10 marks)

 $[2 \times 10 = 20 \text{ marks}]$

D 10583	(Pages : 2)	Name
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FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Chemistry

CHE 5B 06—INORGANIC CHEMISTRY—III

(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. Name the second group cations. How are they precipitated?
- 2. Explain the term co-precipitation and post precipitation.
- 3. How are XeF_2 and XeF_4 prepared? Give their structures.
- 4. What are pseudohalogens? Give examples.
- 5. What is the structure and hybridisation of IF₅.
- 6. Alkali metal in liquid ammonia are coloured. Why?
- 7. Define ionizing solvent.
- 8. Discuss structure of $(SN)_X$.
- 9. What are phosphazenes?
- 10. Mention two measures to control air pollution.
- 11. Triple R is important term in managing waste. Justify
- 12. What are different types of e-wastes?

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

Section B

2

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

- 13. Explain the term microanalysis with suitable examples and mention the advantages.
- 14. Discuss the use of Ellingham diagram in extraction of elements. Using the Ellingham diagram of oxides, determine whether aluminium can be used to reduce MgO.
- 15. Explain the structure and hybridization of ${\rm CIF}_3$ and ${\rm ICI}_3$.
- 16. How are noble gases isolated and separated?
- 17. How silicones are prepared? Discuss their structure and uses.
- 18. How can we prevent thermal and radioactive pollution?
- 19. Discuss the challenges in managing solid wastes.

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

Section C

Answer any **one** question.

The question carries 11 marks.

- 20. How is nickel extracted from its ore?
- 21. How is quality of drinking water assessed? Define three water quality parameters.

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

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FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2022

Chemistry

CHE 5B 06—INORGANIC CHEMISTRY—III

(2019 Admission onwards)

Time: Two Hours

Maximum: 60 Marks

Section A (Short Answers)

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

- 1. How solubility product principle is effected in the separation of II group and IV group cations?
- 2. Mention two advantages of microanalysis.
- 3. Discuss the structure of XeF6 molecule.
- 4. What are interhalogen compounds?
- 5. Cyanogen is considered as pseudohalogen. Why?
- Explain autoionisation of liquid SO₂ and HF with equations.
- 7. What are silicates?
- 8. What are protic and aprotic solvents?
- 9. What are phosphazenes?
- 10. Explain the relation between acid rain and pollution.
- 11. Triple R is important in managing waste. Justify.
- 12. What is greenhouse effect?

(Ceiling of marks: 20)

Section B (Paragraph)

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

- 13. What are the optimum conditions for the formation of precipitation process?
- 14. Write note on structure of xenon fluorides and their reaction with water.

- 15. Explain the structure and hybridization of ${
 m ClF}_3$ and ${
 m ICl}_3$.
- 16. Give an account of preparation properties and structure of $\mathrm{S_4N_4}$.
- 17. Discuss on hydrometallurgy.
- 18. What are the different sources of noise and radioactive pollution?
- 19. Write a note on energy production from waste.

(Ceiling of marks: 30)

Section C (Essay)

Answer any **one** questions.

Each question carries 10 marks.

- 20. Give the name and composition of two ores of Ti. How is titanium extracted from its ore?
- 21. Explain the causes and control measures of air pollution.

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

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FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2023

Chemistry

CHE 5B 06—INORGANIC CHEMISTRY—III

(2019 Admission onwards)

Time: Two Hours

Maximum: 60 Marks

Section A (Short Answers)

Answer questions up to 20 marks.

Each question carries 2 marks.

- 1. How does phosphate interfere in the analysis of group 3 radicals?
- 2. Explain the term microanalysis.
- 3. Discuss the structure of XeF_4 molecule.
- 4. Which is the most stable interhalogen compound among IF, IBr and BrCl?
- 5. Why noble gases are chemically inert?
- 6. What are posphonitrilic chlorides?
- 7. Why are salts less soluble in liquid SO₂ than in water?
- 8. Represent autoionisation of ammonia.
- 9. Discuss the structure and property of $\mathrm{S}_2\mathrm{N}_2.$
- 10. What is acid rain?
- 11. Triple R is important term in managing waste. Justify.
- 12. What are the four major types of medical wastes?

(Ceiling of marks: 20)

Section B (Paragraph)

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

- 13. What are the different methods of precipitate formation?
- 14. Describe zone refining.
- 15. Give an account of pseudohalogens? Discuss the structure of CIF₃.
- 16. Give the structure of oxides and fluorides of Xenon.
- 17. What are silicones? Describe its structure and application.
- 18. Define greenhouse effect.
- 19. Discuss the challenges in managing *e*-waste.

(Ceiling of marks: 30)

Section C (Essay)

Answer any **one** questions.

The question carries 10 marks.

- 20. Name two ores of Uranium. How is uranium metal obtained from its ore?
- 21. Explain the sources of water pollution. What are the control measures for water pollution?

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

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(Pages: 3)

Name	

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS-UG)

Chemistry

CHE 5B 07-ORGANIC CHEMISTRY-II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- Reaction of Phenol with Chloroform and Sodium Hydroxide gives ———.
- 2. Conversion of Carboxylic and into α-halo acid takes place by ———.
- 3. Reagent used in separation of amines by Hinsberg method is ———.
- 4. The IUPAC name of Neopentyl Chloride is -----
- 5. Write the structural formula of But-2-en-1-oic acid.
- 6. Lucas re-agent is a mixture of —
- 7. Glycol when heated with anhyd. ZnCl₂ gives ———
- Liebermann's test is a diagnostic test for ———.
- 9. Metal used in Wurtz reaction is ———.
- 10. Alkyl Magnesium halide is also known as ------

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. Discuss the classification of Heterocyclic compounds.
- 12. Discuss the structure of Furan according to resonance concept.
- 13. What is victor Meyer's test?
- 14. How would you carry out the conversion of Glycerol to Isopropyl Iodide? Give the different steps required for the conversion.
- 15. How will you distinguish between Oxalic acid and Succinic acid?

- 16. How will you distinguish between Acetaldehyde and Acetone?
- 17. Write S.N. on Aldol condensation.
- 18. What is HVZ reaction?
- 19. How is Citric acid prepared from Glycerol?
- 20. Illustrate the term trans-esterification.
- 21. Benzoyl Chloride is hydrolysed at much slower rate than Acetyl Chloride. Why?
- 22. What is Claisen condensation?

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

Section C

Answer any **five** questions.

Each question carries 6 marks.

- 23. Write S.N. on Fischer Indole Synthesis.
- 24. How will you prepare:
 - (a) Furan from Furoic acid.
 - (b) Furan from Furfural.
- 25. How will you distinguish between primary, secondary, tertiary alcohols by:
 - (a) Lucas test.
 - (b) Victor-Meyer method.
- 26. Write a note on electrophilic substitution reaction of Aniline.
- 27. (a) How is Eosin prepared?
 - (b) Give the use of Alizarin as dyestuff.
- 28. (a) Give the preparation of Alizarin.
 - (b) What is Diazotisation?
- 29. (a) What is Reimer-Tiemann reaction.
 - (b) How will you prepare iodoform?
- 30. (a) Explain, why an Alkyl Halide is more reactive than Vinyl Chloride.
 - (b) How will you obtain Cinnamic acid by Knoevangel reaction.

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

Section D

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

- 31. Write S.N. on the following reactions:
 - (a) Kolbe's reaction.
 - (b) Wolf-Kishner reaction.
 - (c) Hofmann's Bromamide reaction.
 - (d) Beckmann re-arrangement.
 - (e) MPV reduction.
- 32. (a) Discuss briefly the structure and reactivity of Carbonyl group.

(5 marks)

(b) Outline the preparation of primary, secondary and teritiary alcohol using Grignard reagent.

(5 marks)

33. (a) Explain the effect of substitution on the acidity of Carboxylic acids.

(4 marks)

- (b) How will you prepare α -hydroxy acids? How will you convert lactic acid into:
 - (a) Propanoic acid.
 - (b) Lactide.

(6 marks)

34. (a) Write a note on Net's Carbonyl Synthesis.

(3 marks)

(b) How will you convert phenol into quinol.

(3 marks)

(c) What is Hofmann and Saytzeff elimination?

(4 marks)

 $[2 \times 10 = 20 \text{ marks}]$

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	FIFTH SEMESTEI	R B.Sc. DEGREE EXAMINATION	ON, NOVEMBER 2019
		(CUCBCSS-UG)	
		Chemistry	
	(CHE 5B 07—ORGANIC CHEMISTR	Y—II
Time	: Three Hours		Maximum: 80 Marks
		Section A	
		Answer all questions. Each question carries 1 mark.	
1.	Reaction of Potassium	-t-butonide with methyl iodide gives —	 .
2.	Structure of pyridine	s represented as ———.	
3.	Dibenzyl ether reacts carbinol. This reaction	with phenyl lithium, followed by acid is known as ———.	hydrolysis to form benzyl phenyl
4.	. The number of structu	ral isomers of alcohols with molecular f	formula C ₃ H ₇ OH is ———.
5.	. Luca's test is used to	determine the type of ———.	
6.	. Oxidation of alkenes v	vith per trifluoroacetic acid forms ———	 .
7.	. The appearance of silv	ver mirror in Tollen's test indicates the p	presence of ———.
8.	Hinberg reagent is —	·	
9.	. Nitrobenzene when re	duced with Zn + NaOH gives ———.	
10.	. Carbyl amine test is a	diagnostic test for ———.	
			$(10 \times 1 = 10 \text{ marks})$
		Section B	
		Answer any ten questions. Each question carries 2 marks.	
11	. Explain why an alkyl	halide is more reactive than vinyl chlor	ide.
12	. How is methyl magne	sium iodide prepared?	
13	. Explain why phenol is	s more acidic than ethyl alcohol.	
14	. Explain Claisen rearr	angment with the mechanism.	
15	. Give an account on th	e mechanism of aldol condensation.	

18. How do you account for acetyl chloride having a lower boiling point than acetic acid?

16. Discuss the structure of carboxylate anion.

17. How is Oxalic acid prepared?

- 19. Explain the role of inductive effect of alkyl group on the strength of basicity of amines.
- 20. How will you distinguish between 1°, 2° and 3° amines?
- Explain the preparation of methyl orange.
- 22. Write the mechanism of Claisen condensation.

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

Section C

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

- Give the mechanism, l stereochemistry and kinetics of SN¹ and SN² reactions for the hydrolysis of alkyl halide.
- 24. (a) Explain Riemer-Tiemann reaction.
 - (b) Write a note on Kolbe's reaction.
- 25. Discuss Wolff-Kishner reduction and MPV reduction.
- 26. (a) Explain HVZ reaction.
 - (b) Explain Blanc's rule.
- 27. Explain the properties of pyridine, furan and indole.
- 28. (a) What is Zaytseff rule? Explain.
 - (b) Differentiate between substitution and elimination reaction.
- 29. (a) Explain the uses and health effects of CCl₄.
 - (b) Explain the uses of chloroform.
- 30. Discuss Cannizzaro reaction and explain the probable mechanism of this reaction. What are the products when a mixture containing formaldehyde and benzylaldehyde is subjected to this reaction?

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

Section D

Answer any two questions. Each question carries 10 marks.

- 31. What is ring substitution in aromatic amines? Write the following ring substitution of aromatic amines:
 - (a) Halogenation.
 - (b) Sulphonation.
 - (c) Nitration.
- 32. (a) What is nitro-acid tautomerism?
 - (b) Write the mechanism and stereochemistry of Hoffmann elimination of amines.
 - (c) What happens when acetaldehyde is treated with diute NaOH?

- 33. (a) What is glacial acetic acid?
 - (b) How do you use benzene diazonium chloride to prepare the following?
 - (i) Phenol.
 - (ii) Bromobenzene.
 - (iii) p-hydroxy azobenzene.
 - (c) Explain Beckmann rearrangement with the mechanism.
- 34. (a) How is urea prepared? Discuss its important reactions.
 - (b) How is phenol manufactured from coal tar? How is it purified?
 - (c) Write a short note on Perkin's reaction.

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

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

(CUCBCSS-UG)

Chemistry

CHE 5B 07-ORGANIC CHEMISTRY-II

Time: Three Hours Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. What is the product obtained when nitrobenzene is reduced electrolytically in strong acidic medium?
- Scientific study of fermentation was first made by ———.
- 3. Arrange in the order of increasing base strength $C_6H_5NH_2$, $C_6H_5CH_2NH_2$, $C_6H_5NHCH_3$.
- 4. Active methylene compounds react with aldehydes in the presence of pyridine to give α, β-unsaturated acids. This reaction is known as ———.
- 5. Zeisel method is used to estimate group in an organic compound.
- 6. Phenol can be distinguished from ethanol by reaction with _____.
- 7. Chlorobenzene on heating with NaOH at 300° C under pressure gives ------
- 8. Which of the following will give iodoform test?
 - (a) CH₃OH;

- (b) CH_3CH (OH) CH_3 ;
- (c) $CH_3CH_2CH_2OH$; and
- (d) $C_6H_5CH_2OH$.
- 9. Identify the products in the following reaction.

2 PhCHO :OH

10. What is the product obtained when anisole is treated with HI?

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

Section B

Answer at least five questions. Each question carries 4 marks. All questions can be attended. Overall Ceiling 20.

- 11. 2, 4, 6-trinitrochlorobenzene can be easily hydrolysed with aqueous sodium carbonate. Why?
- 12. What is Nef reaction?
- 13. What is Walden inversion?
- 14. A liquid was mixed with ethanol and a drop of conc. $\rm H_2SO_4$ was added. A compound with a fruity smell having molecular formula $\rm C_4H_8O_2$ was formed. Identify the liquid and write down the reaction.
- 15. Compare the acidity of the following with suitable explanations:

- 16. Carbonyl compounds react with Grignard reagent to give almost all types of alcohols. Justify this statement.
- 17. Identify the reactions and write down the products X and Y in the following reaction.

- 18. Write a note on Lucas reagent.
- 19. How will you prepare benzene sulphonic acid?
- 20. Write a note on Jones reagent.
- 21. Write down the reagents used in Clemmenson and Wolff-Kishner reduction.
- 22. Explain role of lactic acid in exercise.

 $(5 \times 4 = 20 \text{ marks})$

Section C

Answer at least four questions. Each question carries 7.5 marks. All questions can be attended. Overall Ceiling 30.

- 23. What will be the product when propionaldehyde is treated with NaOH? Discuss the mechanism involved in the reaction.
- 24. Write down the product and depict the mechanism involved in the following conversion.

- 25. Write a note on colour change of phenolphthalein with pH.
- 26. Give any two applications of organozinc compounds and ethylacetoacetate.
- 27. How does Saytzeff's rule in elimination differ from Hofmann's elimination? Illustrate with suitable examples.
- 28. What is Hinsberg reagent? Write down its importance in organic chemistry.
- 29. Write a note on: (a) Explosives; (b) Decarboxylation; and (c) Preparation and use of vanillin.
- 30. Identify X, Y and Z. Among the conversions which is diazotization process? Explain.

$$\begin{array}{c|c}
 & \text{NH}_2 \\
\hline
& Br_2 \text{ (aq)} \\
\hline
& X & \frac{\text{NaNO}_2 + \text{HCI}}{\text{Y}} & \frac{\text{H}_3\text{PO}_2 + \text{H}_2\text{O}}{\text{Y}} \\
\hline
& Z
\end{array}$$

 $(4 \times 7\frac{1}{2} = 30 \text{ marks})$

Section D

Answer any two questions.

Each question carries 10 marks.

- 31. Give a detailed account of elimination- addition and addition elimination mechanism in aromatic nucleophilic substitution reactions. Illustrate with suitable examples.
- 32. Write down the mechanism of the following reactions:
 - (a) Riemer-Tiemann reaction; (b) Perkin's reaction; and (c) Claisen rearrangement.
- 33. Explain the following reactions: (a) Swarts reaction; (b) Schmidt reaction; (c) Etard reaction;(d) Carbylamine reaction; and (e) Claisen condensation.
- 34. Explain the following: (a) Basicity of Guanidine; (b) Preparation and uses of sulpha drugs; and (c) Preparation and uses of citric acid.

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

D 10128	(Pages : 3)	Name
		Reg. No
FIFTH SEMESTER	U.G. DEGREE EXAMINATI	ON, NOVEMBER 2021

(CUCBCSS-UG)

Chemistry

CHE 5B 07—ORGANIC CHEMISTRY - II

Time : Three Hours		Maximum : 80 Marks

Part A

	Answer all questions.
	$Each\ question\ carries\ 1\ mark.$
1.	Reaction of potassium-t-butoxide with methyl iodide gives
2.	Structure of Pyridine is represented as
3.	Dibenzyl Ether reacts with Phenyl Li, followed by acid hydrolysis to form benzyl phenyl carbinol. This reaction is known as
4.	The number of structural isomers of alcohols with molecular formula $\mathrm{C_{3}H_{7}OH}$ is
5.	Luca's test is used to determine the type of
6.	Oxidation of alkenes with pertrifluoro acetic acid forms
7.	The appearance of Silver mirror in Tollen's test indicate the presence of
8.	Hinsberg reagent is
9.	Nitrobenzene when reduced with Zn + NaOH gives
0.	Carbyl amine test is a diagnostic test for
	$(10 \times 1 = 10 \text{ marks})$

Part B

Answer any ten questions. Each question carries 2 marks.

- 1. Explain why an Alkyl halide is more reactive than Vinyl chloride.
- 2. How is methyl magnesium iodide is prepared? Give one use of Grignard reagent.
- 3. Explain why phenol is more acidic than ethyl alcohol.
- 4. Explain Claisen rearrangement with mechanism.
- 5. Give an account on the mechanism of aldol condensation.
- 6. Discuss the structure of Cabonylate anion.

- 7. How is oxalic acid is prepared?
- 8. How do you account for acetyl chloride has lower boiling point than acetic acid?
- 9. Explain the role of inductive effect of alkyl group on the strength of basicity of amines.
- 10. How will you distinguish between 1°, 2° and 3° amines.
- 11. Explain the preparation methyl orange.
- 12. Write the mechanism of Claisen condensation.

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

Part C

Answer any **five** questions.

Each question carries 6 marks.

- 1. Give the mechanism, stereochemistry and kinetics of SN^1 and SN^2 reactions for the hydrolysis of alkyl halide.
- 2. (a) Explain Riemer-Tiemann reaction.
 - (b) Write a note on Kolbe's reaction.
- 3. Discuss Wolff-Krishner reduction and MPV reduction.
- 4. (a) Explain HVZ reaction.
 - (b) Explain Blanc's rule.
- 5. Explain the properties of pyridine; furan and indole.
- 6. (a) What is Zaytseff rule? Explain.
 - (b) Differentiate between substitution and Elimination raction.
- 7. (a) Explain the uses and health effects of CCl₄.
 - (b) Explain the uses of Chloroform.
- 8. Discuss Canizarro reaction and explain probable mechanism in this reaction. What are the products when a mixture containing fermaldehyde and benzaldehyde is subjected to this reaction?

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

Part D

Answer any two questions.

Each question carries 10 marks.

- 1. What is ring substitution in aromatic amines? Write the following ring substitution of aromatic amines:
 - (a) Halogenation; (b) Sulphonation; (c) Nitration.

- 2. (a) What is nitro air tautomerism?
 - (b) Write mechanism and stereochemistry of Hoffman elimination of amines.
 - (c) What happens when acetaldehyde treated with diluted NaOH?
- 3. (a) What is glacial acetic acid?
 - (b) How do you use benzene diazomum chloride to prepare (i) Phenel; (ii) Bromobenzene; (iii) Diphenyl; (iv) P-hydroxy a 30 benzene.
 - (c) Explain Beckmann rearrangement with mechanism.
- 4. (a) How is urea prepared? Discuss its important reactions.
 - (b) How is phenol manufactured for coaltar and how is it purified.
 - (c) Write a note on Perkin's reaction.

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

FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Chemistry

CHE 5B 07—ORGANIC CHEMISTRY—II

(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. Which is more acidic, propanol or isopropanol? Why?
- 2. An alkoxide is a stronger base than hydroxide ion. Justify.
- 3. How will you convert phenol to salicylaldehyde?
- 4. What is PTC? Give examples.
- 5. Complete the reaction:



- 6. Suggest reactions for the conversion of ethyl magnesium chloride to 1-propanol.
- 7. What products are formed when CH₃MgI is treated with ethanol?
- 8. What is urotropine? How it is prepared?
- 9. What is Etard's reaction?
- 10. Which is more acidic, acetic acid or chloroacetic acid? Why?
- 11. What is Hofmann's Bromamide degradation? Explain with examples.
- 12. Pyridine undergoes nucleophilic substitution reaction easily. Why?

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

Section B (Short Answers)

2

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

- 13. How will you prepare phenolphthalein? Explain its colour change with pH.
- 14. Explain oximercuration-demercuration reaction for the preparation of alcohols.
- 15. What is Claisen rearrangement? Explain its mechanism.
- 16. What is Tollen's reagent? How it is used to test the presence of aldehydes?
- 17. How will you convert acetic acid to acetaldehyde and acetic acid to acetone?
- 18. What is Hofmann's elimination? Explain with suitable examples.
- 19. Write notes on Fischer Indole synthesis.

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

Section C (Essays)

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

- 20. How will you separate a mixture of 1°, 2°, and 3° amines?
- 21. Write notes on: Kolbe's electrolysis; HVZ reaction; Reformatsky reaction; and Chichibabin reaction.

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

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2022

Chemistry

CHE 5B 07—ORGANIC CHEMISTRY-II

(2019 Admission onwards)

Time: Two Hours

Maximum: 60 Marks

Section A (Short Answers)

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

- 1. The boiling points of alcohols are much higher than the corresponding aliphatic hydrocarbons. Why?
- 2. What is PCC ? Name the molecule formed when CH_3 - CH_2 - CH_2 -OH is treated with PCC ?
- 3. What are crown ethers? Give two examples.
- 4. Name the product formed for the following reaction

$$CH_{3}MgBr + CO_{2} \xrightarrow{H_{2}O/H^{+}}$$

- 5. What are Frankland's reagents? How are they prepared?
- 6. Suggest a suitable reagent for the following conversion

Benzoyl chloride --- Benzaldehyde

- 7. How will you convert toluene to benzaldehyde?
- 8. Which among the following is a stronger acid, p-nitrobenzoic acid or benzoic acid? Why?
- 9. How will you convert acetic acid to propanoic acid?
- 10. CH₃-CH₂-NO₂ reacts with NaOH. Why?
- 11. How will you convert benzoic acid to aniline?
- 12. Pyridine is less basic than aliphatic amines. Why?

(Ceiling of marks: 20)

Section B (Short Answers)

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

- 13. How would you distinguish between 1°, 2° and 3° alcohols?
- 14. What is Williamson's synthesis? How will you prepare anisole and phenetole using Williamson's synthesis?
- 15. What is Reformatsky reaction? What is its synthetic use?
- 16. How will you distinguish pentan-2-one and pentan-3-one?
- 17. Suggest a suitable reaction for the preparation of α halo acid. Explain using examples.
- 18. How will you prepare amines using Gabriel's phthalimide synthesis?
- 19. Starting from ethylacetoacetate, how will you prepare succinic acid?

(Ceiling of marks: 30)

Section C (Essay)

Answer any **one** question.

The question carries 10 marks.

- 20. a) Explain the mechanism of pinacol-pinacolone rearrangement.
 - b) Discuss the mechanism of bromination and nitration of phenol.
- 21. Write notes on:

Aldol condensation

Cannizzaro reaction

Benzoin condensation

Perkin's reaction.

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

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2023

Chemistry

CHE 5B 07—ORGANIC CHEMISTRY—II

(2019 Admission onwards)

Time: Two Hours

Maximum: 60 Marks

Section A (Short Answers)

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

- 1. How will you prepare an azo dye?
- 2. What is Libermann's nitroso reaction?
- 3. How will you convert 2-amino propane to isopropanol?
- 4. What is Williamson's synthesis?
- 5. What product is formed when CH₃MgBr reacts with acetone followed by hydrolysis?
- 6. How will you distinguish between aldehyde and ketone?
- 7. What is Borsche's reagent? What is its use?
- 8. How will you convert acetic acid to acetone?
- 9. What is Rosenmund's reduction?
- 10. Describe how the following conversion is carried out

- 11. Draw the structure of sulphapyridine and sulphadiazine.
- 12. Discuss the tautomerism in nitrocompounds.

(Ceiling of marks: 20)

Section B (Short Answers)

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

- 13. What is Claisen rearrangement? Explain its mechanism.
- 14. What is Aldol condensation? Explain the mechanism.
- 15. What is haloform reaction? What is its utility?
- 16. How will you prepare β hydroxy carboxylic acids using organozinc compound?
- 17. How will you bring about the following conversions

Acetic acid → Propanoic acid

Propanoic acid → Acetic acid

- 18. What is Schotten-Baumann reaction? What is its use?
- 19. How will you distinguish between 1°, 2°, and 3° amines?

(Ceiling of marks: 30)

Section C (Essay)

Answer any **one** question.

The question carries 10 marks.

- 20. Explain the reduction products of nitrobenzene under different conditions.
- 21. a) How will you prepare ethylacetoacetate?
 - b) Write notes on any four synthetic applications of ethylacetoacetate.

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

D 50	0113	(Pages : 3)	Name
			Reg. No
FIFT	TH SEMESTER (CUCBCSS-UG)	DEGREE EXAMIN	ATION, NOVEMBER 2023
		Chemistry	
	CHE 5B 07—O	RGANIC CHEMISTRY	- II
	(20)	18 Admissions)	
Time	: Three Hours		Maximum: 80 Marks
		Part A	
		ver all questions. estion carries 1 mark.	
1.	Reaction of n -prophyl alcohol with HE	Br gives ———.	
2.	Jone's Reagent is ———.		
3.	Structure of Furan is represented as -		
4.	Grignard Reagent reacts with Ketone	followed by Acid hydroly	rsis to give ———.
5.	Lucas Reagent is ———.		
6.	The isomerism exhibited by CH_3 – O –	$\mathrm{CH}_2 - \mathrm{CH}_2 - \mathrm{CH}_3$ and CH_3	$H_3 - O - CH (CH_3)_2$ is ———.
7.	Acetaldehyde on treatment with Tolle	n's reagent gives a precip	oitate of ———.
8.	Reduction of nitro alkanes results in t	he formation of ———.	
9.	Reaction of benzene diazonium chloric	de with H_3PO_2 Cu gives	 .
10.	Nitrobenzene reduces with Sn + HCl ş	gives ———.	
			$(10 \times 1 = 10 \text{ marks})$
		Part B	
		any ten questions. stion carries 2 marks.	
1.	Rate of SN ² reaction is affected by ster	ric factors.	
2.	Write a short note on reformatsky read	ction.	
3.	Explain the indicator action of phenol	phthalein.	
4.	All ethers are Lewis bases. Justify this	statement.	
5.	Give two tests to distinguish between	Aldehyde and Acetone.	

- 7. Describe the synthesis of Cinnamic acid.
- 8. Explain why boiling points of carbonylic acid are higher than corresponding alcohols.
- 9. Why Amines are basic in nature?
- 10. Write a short note on Carbylamine reaction.
- 11. What is diazo reaction?
- 12. Explain Tautomerism.

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

Part C

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

- 1. Give the mechanism, stereochemistry and kinetics of \mathbf{E}_2 and \mathbf{E}_1 reactions in alkyl halides.
- 2. (a) What is pinacole pinacolone rearrangement, give its mechanism.
 - (b) Write a note on acidity of phenols.
- 3. Illustrate with one suitable eg: the following:
 - (a) Canizarro reaction.
- (b) Aldol condensation.
- 4. Explain the synthesis and application of Saccharin.
- 5. Explain the synthetic application of Ethyl aceto acetate.
- 6. Explain Nucleophilia aromatic substitution with mechanism.
- 7. (a) Explain preparation of Phenol from Cumene and Sulphonic acid.
 - (b) Discuss the application of Alizarin.
- 8. Briefly explain the preparation and uses of Sulfadrugs.

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

Part D

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

- 1. How to prepare Grignard reagent and explain its synthetic application.
- 2. Explain Electrophilic substitution reactions of Aniline:
 - (a) Halogenation.

(b) Sulphonation.

(c) Nitration.

3 **D** 50113

- 3. (a) Explain separation of Amines by Hinsberg method.
 - (b) Explain the basicity of Guanidine.
 - (c) Write a short note on Gabriel-Pthalimide reaction for the synthesis of amine.
- 4. (a) Discuss the preparation and synthetic application of benzene diazonium chloride.
 - (b) How is acetaldehyde is prepared in the laboratory?

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

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(Pages : 2)

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	Y Y

Reg. No....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS-UG)

Chemistry

CHE 5B 08-PHYSICAL CHEMISTRY-II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- Example of a system exhibiting Fluorescence is ———.
- 2. Two examples of lyophilic sols are ______
- 3. Gold number of the protective colloid starch is ————
- 4. Examples of substances which are efflorescent under normal conditions are ______.
- 5. Example of water in oil emulsion is ———,
- 6. Two substances which are used as adsorbent column (stationary phase) in column chromatography are ————.
- 7. Rf value is defined as
- 8. Examples of two molecules possessing improper axis of symmetry are ———.
- The symmetry elements of the molecule benzene are ———.
- 10. How many rotational and vibrational modes are possible for HCN?

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. What is zeta potential?
- 12. What is meant by activated complex?
- 13. Give a labelled phase diagram of water system.
- 14. Define the term Phase.
- 15. What is homogeneous catalysis? Give an example.
- 16. Define rate of a reaction.
- 17. Define improper axis of rotation. Give an example.
- 18. Give two examples of molecules belonging to C_{2h} point group.

- 19. How are wavelength, wave number, velocity and frequency related?
- 20. Calculate the energy of radiation of wavelength 700 nm.
- 21. Sketch the different modes of vibration of CO2. Which of these are IR active?
- Give two examples for photosensitized reactions.

Section C

Answer any five questions.

Each question carries 6 marks.

- 23. What is the principle of NMR spectroscopy?
- 24. What are the applications of IR spectroscopy?
- 25. Explain the principle of steam distillation.
- 26. State and explain (i) Grottus-Draper Law; (ii) Stark-Einstein law.
- 27. Discuss the transition state theory of reaction rates.
- 28. Give an example of simple Eutectic system and briefly discuss its salient features with the help of its phase diagram.
- 29. Discuss briefly Freundlich Isotherm.
- 30. Discuss the applications of colloidal chemistry in Industry and in medicine.

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

Section D

Answer any two questions. Each question carries 10 marks.

- 31. (a) Discuss the principle, process and applications of Gas-liquid chromatography.
 - (b) Discuss the different aspects of column chromatography and its applications.

(5+5=10 marks)

- 32. (a) Write S.N. on Jablouski diagram.
 - (b) Discuss the theory of heterogeneous catalysis.
 - (c) Derive an integrated equation for the rate constant of a first order reaction.

(3+3+4=10 marks)

- 33. (a) Differentiate between chemisorption and physisorption.
 - (b) Define Group. Discuss the rules that members of a group must obey.

(5 + 5 = 10 marks)

- 34. (a) Construct the GMT for C_{2v} point group.
 - (b) Briefly discuss applications of Nernst Distribution Law.

(5 + 5 = 10 marks)

 $2 \times 10 = 20$ marks

DI	0216 (Pages : 2)	Name
		Reg. No
	FIFTH SEMESTER B.Sc. DEGREE EXAMINATION	ON, NOVEMBER 2019
	(CUCBCSS-UG)	
	Chemistry	
	CHE 5B 08—PHYSICAL CHEMISTRY-	—II
Time :	: Three Hours	Maximum: 80 Marks
	Section A	
	Answer all questions. Each question carries 1 mark.	
1.	Example of a molecule belonging to C _{3v} point group is —	
2.	The number of components and variance of the following system	
	Ice water water vapour.	
3.	The number of vibrational modes possible for SO_2 is ———————————————————————————————————	
4.	Which among the carbon isotopes has a nuclear spin?	
	11 12 13 and C.	
5.	Give an example of Photochemical reaction.	
6.	Calculate the energy of an Einstein of radiation of wavelength	250 nm.
7.	R _f value is defined as ———.	
8.	Catalyst used in Zeigler-Natta polymerisation is ————.	
9.	Arrhenius equation which expresses the variation of rate conten	t of a reaction with temperature is
10.	An example of a molecule with centre of inversion is ————	
		$(10 \times 1 = 10 \text{ marks})$
	Section B	
	Answer any ten questions. Each question carries 2 marks.	
11.	State mutual exclusion rule. Illustrate with example.	
12.	Write a note on azeotropic mixtures.	
13.	How does temperature influence the rate of a reaction? Explai	n.
14.	State Stark. Einstien law and explain the term Quantum yield	of a photochemical reaction
15.	Write S.N. on Thin layer chromatography.	
10.	Wille Siri	,

- 16. What is Dorn effect?
- 17. Briefly discuss chemisorption.
- 18. Define proper axis and improper axis of symmetry.
- State and explain Frank-Condon principle.
- 20. What is meant by (i) Finger print print region; (ii) Chemical shift?
- 21. Distinguish between adsorption and absorption.
- 22. Write S.N. as phosphorescence.

Section C

Answer any five questions. Each question carries 6 marks.

- 23. Write S.N. on (a) Electrical double layer; (b) Protective colloids.
- 24. Define group and point group. construct GMT for C2v point group.
- Discuss theory of Homogenous and Heterogeneous catalysis.
- 26. Describe the collision theory of reaction rates.
- 27. Explain Pattinson's process of desiliverization of lead.
- 28. State and explain Nernst distribution law.
- 29. Discuss principle, process and applications of Gas chromatography.
- 30. What are the rules that members of a group must obey ??

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

Section D

Answer any two questions. Each question carries 10 marks.

- 31. (a) Write S.N. as Jablonski diagram.
 - (b) Optical and electrical properties of colloids.
- 32. (a) Write S.N. on (i) photochemical Hydrogen-Bromine reaction; (ii) BET equation.
 - (b) Draw the phase diagram of water system and discuss the application of phase rule to the system.
- 33. (a) Briefly discuss Langmuir and Freundlich Isotherms.
 - (b) Upper CST and lower CST.
- 34. (a) Distinguish between Emulsions and gels.
 - (b) Write S.N. as NMR spectroscopy.
 - (c) Stoke's and antistoke's lines.

(4 + 4 + 2 = 10 marks) $[2 \times 10 = 20 \text{ marks}]$

D 10	0129	(Pages: 3)	Name					
			Reg. No					
	FIFTH SEMESTER U	.G. DEGREE EXAMINATIO	N, NOVEMBER 2021					
		(CUCBCSS—UG)						
		Chemistry						
	CHE	5B 08—PHYSICAL CHEMISTR	Y—II					
Time:	Three Hours		Maximum: 80 Marks					
		Section A (One Word)						
		Answer all questions.						
		Each question carries 1 mark.						
1.	The unit for rate constant for	or a first order reaction is ———.						
2.	The point group of water m	olecule (H_2O) is ———.						
3.	How many numbers of sign	als would be expected in ${}^{13}\mathrm{C}\ \mathrm{NMR}$ s	spectra of Glycol and ethanol?					
4.	In a reaction if the concentra	ation of reactant A is tripled, the rate	e of reaction becomes twenty seven					
	times. What is the order of t	the reaction?						
5.	The selection rule for rotation	onal spectroscopy considering atoms	s as rigid rotor is ———.					
6.	As per Stark-Einstein law,	the number of photons absorbed for	a molecule to react is ———.					
7.	In adsorption, if the concen	tration of a substance in the interfa	ce is high, it is called ———.					
8.	In a single - component cophases that can co-exist is -	ndensed system, if degree of freed	om is zero, maximum number of					
9.	Fluorescence arises from the	e ——— vibrational level of the fir	st excited electronic state to one of					
	the vibrational levels in the	electronic ground state.						
10.	The ratio of distance travell	led by a substance to distance travel	led by a solvent front in thin layer					
	chromatography is							
			$(10 \times 1 = 10 \text{ marks})$					
			Turn over					

D 10129

Section B (Short Answer)

2

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

- 11. What is molecularity of a reaction? Order higher than three is very rare? Why?
- 12. Draw the miscibility temperature verses percentage composition graph for phenol water system and define CST.
- 13. Absolute ethanol cannot be prepared by simple distillation of ethanol water mixture. Why?
- 14. How does the percent transmittance of a solution vary with : (a) Increasing concentration ; and (b) Increasing path length ?
- 15. What are the Stokes lines and antistokes lines?
- 16. What is Chemiluminescence? Write an example.
- 17. How force constant is related to bond length and bond order?
- 18. What is TMS? Why is it used as a standard reference in NMR spectroscopy?
- 19. List all the symmetry operations for trans-1, 2-dichloroethylene of C2h symmetry.
- 20. Write the important characteristics of enzyme catalysis.
- 21. Write the principle of gel permeation chromatography.
- 22. Distinguish proper and improper axis of rotation.

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

Section C (Paragraph)

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

- 23. Derive an expression for rate constant of a first order reaction. If a first-order reaction is 29.6% complete after 18.4 seconds, how long will it take to complete four half-life periods?
- 24. How does IR spectroscopy differ from Raman spectroscopy?
- 25. Explain Freundlich adsorption isotherm. What are its limitations?
- 26. Explain the principle of fractional distillation using temperature composition diagrams.

3 D 10129

- 27. Briefly explain Donnan membrane equilibrium.
- 28. Discuss the working principle of gas chromatography.
- 29. How will you determine the bond length from rotational spectral data?
- 30. What is multiplication table in molecular symmetry? Construct the multiplication table for C3v point group.

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

Section D (Essay)

Answer any **two** questions.

Each question carries 10 marks.

- 31. Differentiate order and molecularity of a reaction and briefly discuss the different methods used for the determination of order of a reaction.
- 32. (a) What are surfactants, explain its role in daily life?
 - (b) Briefly explain the phase diagram of water.
- 33. (a) Explain the importance of Frank-Condon principle in the electronic transitions.
 - (b) How the concept of Simple harmonic oscillator is used for the explanation of ir spectra.
- 34. (a) Briefly explain the principle of thin layer chromatography and explain its importance as a supplementary system in column chromatography.
 - (b) With the help of Jablonski diagram explain Fluorescence and Phosphorescence.

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

\mathbf{D}	q	n	1	2	q
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(Pages: 3)

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Reg. No.....

FIFTH SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS-UG)

Chemistry

CHE 5B 08-PHYSICAL CHEMISTRY-II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. Give one example of heterogeneous catalysis.
- 2. Define order of a reaction.
- 3. Instantaneous emission of radiant energy after its absorption by a substance is called ———.
- 4. When the temperature increases, adsorption ———.
- 5. At triple point of water, the number of degree of freedom is ———.
- 6. Define Phase.
- 7. Expand HPLC.
- 8. The number of NMR signals that the protons of TMS give is ———.
- 9. Give the mathematical representation for the rotational constant B.
- 10. Define identity operation.

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

Section B

Answer at least five questions.

Each question carries 4 marks.

All questions can be attended.

Overall ceiling 20.

- 11. What is hyperfine splitting in ESR spectroscopy?
- 12. Sketch the vibrational modes of H₂O.

- 13. What is a mathematical group?
- 14. Write a short note on gas chromatography.
- 15. Explain the term congruent melting point. Give an example of such a binary condensed system.
- 16. State and explain Nernst distribution law.
- 17. Explain zeta potential.
- 18. Sketch the Langmuir adsorption isotherm.
- 19. Differentiate between adsorption and absorption.
- 20. State Grothus-Draper law of photochemical equivalence.
- 21. What is fluorescence?
- 22. Explain steady state approximation.

Section C

Answer at least four questions.

Each question carries 7.5 marks.

All questions can be attended.

Overall ceiling 30.

- 23. Draw the Jablonski diagram and explain the various transitions involved.
- 24. Define quantum yield of a photochemical reaction. Explain the high quantum yield for the light induced hydrogen-chloride reaction.
- 25. Discuss on the ESR spectrum of phenyl radical.
- 26. What is meant by chemical shift? Discuss the factors affecting it.
- 27. Discuss the phase diagram of lead-silver system.
- 28. Explain the group multiplication table for \mathbf{C}_{2h} point group.
- 29. How does temperature affect rate of a reaction. Arrive at the Arrhenius equation and explain the influence on reaction rate.
- 30. Write a note on optical and electrical properties of colloids.

 $(4 \times 7.5 = 30 \text{ marks})$

Section D

Answer any two questions. Each question carries 10 marks.

- 31. (a) Discuss on Lindemann theory of unimolecular reactions.
 - (b) Write a note on thin layer chromatography.
- 32. (a) Discuss the phase diagram of sodium sulphate-water system.
 - (b) What are partially miscible and immiscible liquid systems? Give examples for each.
- 33. (a) Discuss on the complementary character of IR and Raman spectroscopies.
 - (b) Write a note on emulsions and gels.
- 34. (a) What are singlet and triplet states?
 - (b) What are the applications of rotational spectroscopy?

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

D 10585	(Pages : 2)	Name
		Reg. No

FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS—UG)

Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY-II

(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. Define temper coefficient of a chemical reaction.
- 2. What is meant by steady-state approximation?
- 3. Give the mathematical expression for Freundlich adsorption isotherm and explain the terms.
- 4. Discuss briefly the theory of homogeneous catalysis.
- 5. What is triple point? What are its characteristics?
- 6. What is the maximum number of phases possible for two component systems?
- 7. What are condensed systems? Give the phase rule for condensed systems.
- 8. What do you mean by finger print region in IR spectra?
- 9. State and explain mutual exclusion principle.
- 10. What is Frank-Condon principle?
- 11. How many ESR signals are given by methyl radical?
- 12. State Stark-Einstein's law of photochemical equivalence.

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

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Section B (Short Answers)

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

- 13. Derive integrated rate equation for zero order kinetics. What are the features of zero order kinetics?
- 14. A first order reaction is 20% complete in 15 minutes at 40°C and in 3 minutes at 60°C. Calculate the activation energy for the reaction.
- 15. How will you determine the order of a reaction using half life method?
- 16. Explain any five applications of adsorption.
- 17. What is chemical shift? Why TMS is used as a standard in NMR spectra?
- 18. What is Photosensitization? Explain with suitable examples.
- 19. With the help of Jablonsky diagram, explain fluorescence phenomena.

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

Section C (Essay)

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

- 20. a) State distribution law? What are its characteristics?
 - b) Derive distribution law and briefly explain any *two* applications.
- 21. Discuss in detail the vibrational spectra of anharmonic oscillator.

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

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2022

Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY—II

(2019 Admission onwards)

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 order of a reaction?
- 2. Explain Michaelis-Menten theory for enzyme catalysis.
- 3. Derive half life period for zero order reaction.
- 4. What is homogeneous catalysis? Give examples.
- 5. Define CST. Give examples for systems with upper and lower CST values.
- 6. What is eutectic temperature?
- 7. Explain Born-Oppenheimer approximation.
- 8. How many vibrational modes are possible for H₂O molecule?
- 9. What are Chromophores? Give examples.
- 10. How many NMR signals are given by ethyl methyl ketone?
- 11. State Grothus-Draper law.
- 12. What is ISC? How it takes place?

(Ceiling of marks: 20)

Section B (Short Answers)

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

- 13. Derive integrated rate equation for first order kinetics. What are the features of first order kinetics?
- 14. How will you determine the surface area of an adsorbent from the isotherm data?

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- 15. Derive Nernst's distribution law.
- 16. Explain Pattinson's process of desilverisation of lead.
- 17. Distinguish between deliquescence and efflorescence.
- 18. What are the informations obtained from the NMR spectra of an organic molecule?
- 19. What is the difference between fluorescence and phosphorescence?

(Ceiling of marks: 30)

Section C (Essay)

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

- 20. Explain any four methods to determine the order of a reaction.
- 21. Discuss in detail the microwave spectra of a rigid diatomic molecule. How will you calculate the bond length using microwave spectra?

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

D 50573	(Pages : 2)	Name
		Reg. No

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION NOVEMBER 2023

Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY—II

(2019 Admission onwards)

Time: Two Hours

Maximum: 60 Marks

Section A (Short Answers)

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

- 1. Write Arrhenius equation and explain the terms.
- 2. Higher order reactions are not possible in chemical reactions. Why?
- 3. Write Michaelis-Menten mechanism for enzyme catalysis.
- 4. Write any *four* postulates of Langmuir isotherm.
- 5. What are two component systems? What are the maximum phases possible for two component systems?
- 6. What are freezing mixtures? Give examples.
- 7. With the help of energy level diagram, discuss the possible electronic transitions in an organic molecule.
- 8. What is the selection rule for anharmonic oscillator?
- 9. Explain the two scales used in NMR. How are they related?
- 10. What is the basic requirement for a molecule to exhibit ESR spectra?
- 11. What is Chemiluminescence?
- 12. State Grothus-Draper law.

(Ceiling of marks: 20)

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Section B (Short Answers)

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

- 13. Derive integrated rate equation for second order reaction with same reactants.
- 14. With suitable examples, explain the theory of homogeneous catalysis.
- 15. Discuss the phase diagram of water system.
- 16. What is CST? Discuss systems with upper and lower CST.
- 17. What are fundamental and overtone bands in IR spectra?
- 18. Discuss the high resolution NMR spectra of CH_3CHO molecule.
- 19. What is quantum yield of a photochemical reaction? What are the reasons for high and low quantum yield?

(Ceiling of marks: 30)

Section C (Essay)

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

- 20. What are unimolecular reactions? Explain Lindemann's mechanism for unimolecular reactions.
- 21. Discuss the rotational Raman spectra of pure diatomic molecules.

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

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS-UG)

Chemistry

CHE 5B 08--PHYSICAL CHEMISTRY-II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. The radiation absorbed in vibrational spectroscopy is ———.
- 2. The number of fundamental modes of vibration in CH₃Cl is ———.
- 3. What is the point group of H₂O molecule?
- 4. Solutions with same osmotic pressure is called ———.
- 5. Mention the number of phases present in mixture of H₂, O₂ and N₂.
- 6. The unit of first order reaction is:
- 7. Name a non-radiative transition.
- 8. Give an example for a symmetric top molecules.
- 9. Decrease in the intensity of an absorption band is called:
- 10. The minimum vibrational energy of a molecule is:

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. Explain the term gold number.
- 12. Crystalline Na₂CO₃ 10 H₂O on keeping in air become white powder. Why?
- 13. What is congruent melting point? Give one example.
- 14. Explain Hardy Schulze rule with suitable example.
- 15. Rotation-reflection axis is also called improper axis. Why?
- 16. Explain the term R_f value.

- 17. Explain an auxochrome with a suitable example.
- 18. Distinguish between order and molecularity
- 19. What is meant by zero order reaction? Give one example.
- 20. What is meant by critical solution temperature?
- 21. The half life time of a first order reaction is 450 s. Calculate the rate constant for the reaction.
- 22. Derive the rate expression for a first order reaction.

Section C

Answer any five questions.

Each question carries 6 marks.

- 23. Construct the multiplication table for C_2V point group.
- 24. Derive Langmuir adsorption isotherm. Discus its features.
- 25. Explain ion exchange chromatography with a suitable example.
- 26. Explain briefly the origin of rotational spectrum.
- 27. What is zeta potential? What is its significance?
- 28. Explain with example the terms phase, number of components and degrees of freedom.
- 29. Write a note on photochemistry of Hydrogen-Chlorine reaction.
- 30. Derive an expression for a first order reaction.

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

Section D

Answer any **two** questions.

Each question carries 10 marks.

- 31. (a) Explain the theory of NMR spectroscopy.
 - (b) Write a note on the factors influencing rate of a reaction.

(5 + 5 = 10 marks)

- 17. Explain an auxochrome with a suitable example.
- 18. Distinguish between order and molecularity
- 19. What is meant by zero order reaction? Give one example.
- 20. What is meant by critical solution temperature?
- 21. The half life time of a first order reaction is 450 s. Calculate the rate constant for the reaction.
- 22. Derive the rate expression for a first order reaction.

Section C

Answer any five questions.

Each question carries 6 marks.

- 23. Construct the multiplication table for C₂V point group.
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- 29. Write a note on photochemistry of Hydrogen-Chlorine reaction.
- 30. Derive an expression for a first order reaction.

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

Section D

Answer any **two** questions.

Each question carries 10 marks.

- 31. (a) Explain the theory of NMR spectroscopy.
 - (b) Write a note on the factors influencing rate of a reaction.

(5 + 5 = 10 marks)

- 32. (a) Discuss the principles of thin layer chromatography.
 - (b) Discus the phase diagram of water.
 - (c) State and explain Stark-Einstein's law of photochemical equivalence. What is its significance?

$$(3 + 4 + 3 = 10 \text{ marks})$$

- 33. (a) Write a note on preparation and purification of colloids.
 - (b) The frequency separation of successive lines in the rotational spectrum of HCl is 21.18 cm⁻¹. Calculate the bond length.

$$(5 + 5 = 10 \text{ marks})^{-1}$$

- 34. (a) Discuss the Lindemann theory of unimolecular reactions.
 - (b) Write a note on gel permeation chromatography.
 - (c) Write a note on chemiluminiscence.

$$(5 + 3 + 2 = 10 \text{ marks})$$

$$[2 \times 10 = 20 \text{ marks}]$$

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS-UG)

Chemistry/Polymer Chemistry/Industrial Chemistry

CHE 5B 07—ORGANIC CHEMISTRY—II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

1. Frankland reagent is ———.

2. The structural formula of Sulphadiazine is ———.

3. Benzene diazonium chloride on heating with hypophorous acid gives ———.

4. The major product obtained by reacting Nitrous acid with dimethyl amine is ———.

5. Williamson's method is used to prepare ————.

6. The structure of Indole is represented as ————.

7. Phenol on Kolbe's reaction gives ————.

8. m-Dinitrobenzene on reduction with ammonium sulphide gives ————.

9. A mixture of anhydrous ZnCl₂ and HCl is known as ————.

10. 2-Methyl 2-butanol on treating with concentrated H₂SO₄, the major product obtained will be

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

Section B

Answer any ten questions.

Each question carries 2 marks.

- 11. Outline the method to prepare saccharin from toluene.
- 12. What is Knoevenagel reaction?
- 13. Explain Blane's rule.
- 14. What reagents and reaction conditions would you use to prepare t-Butyl alcohol from Isobutyl alcohol?
- 15. Write the mechanism of Riemer-Tiemann reaction.
- 16. Explain the mechanism of E2 reaction.

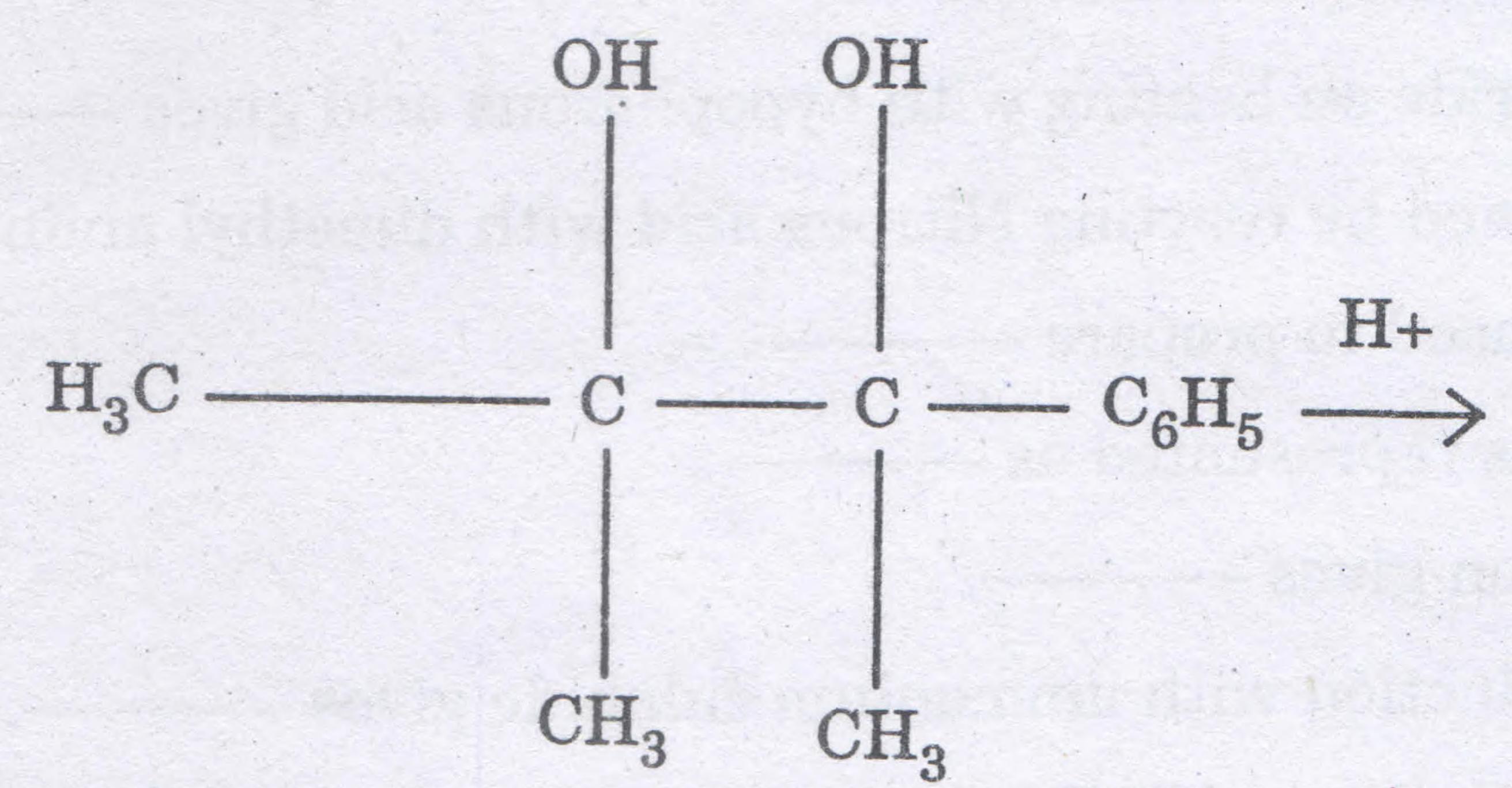
- 17. What are the products obtained when methyl amine is treated with methyl iodide?
- 18. Explain Gabriel phthalimide synthesis.
- 19. Give the synthesis of Alizarin.
- 20. Give a method of preparation of Sulphanilamide.
- 21. What is Wolfkishner reduction?
- 22. What is diazotisation? Give an example of coupling reaction.

Section C

Answer any five questions.

Each question carries 6 marks.

- 23. (a) What is Victor Mayer test?
 - (b) Predict the major product and discuss the mechanism of the following reaction:



- 24. (a) What is Hoffman's bromamide reaction?
 - (b) Describe the Hinesburg method of separation of primary, secondary and tertiary amines from their mixture.
- 25. How is ethyl acetoacetate prepared? Give three imporant synthetic applications.
- 26. (a) Give two reactions of alkyl lithium to show its synthetic applications.
 - (b) How are the following compounds prepared?
 - (i) 2-Methyl 2-butanol from 2-propanol; (ii) Acetaldehyde to Crotonic acid.
- 27. How are the following compounds prepared:
 - (a) 2, 4, 6-tribromobenzene from aniline; (b) Citric acid; (c) Methyl orange.
- 28. (a) Write a method each for the preparation of the following compounds:

- (i) Pyridine; (ii) Indole.
- (b) Arrange the following aliphatic amines in the decreasing order of their basicity-Trimethylamine, Diemthylamine, methyl amine and ethyl amine. Justify your answer.
- 29. (a) Discuss the various products obtained by the reduction of nitrobenzene in acidic, basic and neutral media.
 - (b) What is Perkins reaction?

- 30. (a) Discuss addition elimination mechanism of aromatic nucleophilic substitution reactions. Give the evidence in support of this mechanism.
 - (b) Would you expect 1-bromo 2-methylbutane to be more/less active than 1-bromo 3-methylbutane is SN2 reaction? Explain.

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

Section D

Answer any two questions.

Each question carries 10 marks.

- 31. (a) What is Benzyne mechanism for nucleophilic substitution reactions? Give evidence in support of your answer.
 - (b) Acid catalysed ring opening of isopropylene oxide gives 2-Methoxy-2-methyl-1-propanol while base catalysed ring opening of the compound gives 1-Methoxy-2-methyl-2-propanol. Explain.
 - (c) Describe Ziesel's method of estimation of alkoxy group.

(4 + 4 + 2 = 10 marks)

- 32. (a) Write the mechanism of SN2 reaction. Discuss how is the structure of substrate molecule and nucleophilicity of the attacking reagent affect the reactivity of an SN₂ reaction.
 - (b) Explain Vinyl halides are much less reactive while allyl halides are unusually reactive in nucleophilic substitution.
 - (c) Define Saytzeff's rule with one example.

(5 + 3 + 2 = 10 marks)

- 33. Illustrate the mechanism of the following reactions:
 - (i) Cannizaro reaction.
- (ii) Beckmann rearrangement.
- (iii) Aldol condensation.
- (iv) Riemer Tiemann reaction.
- (v) Claisen rearrangement.
- 34. Explain why:
 - (i) Carboxylic acids are stronger acids than alcohol.
 - (ii) Lactic acid gives iodoform test.
 - (iii) Metanitrobenzoic acid is a weaker acid than paranitrobenzoic acid.
 - (iv) 2, 6-Dimethyl benzoic acid, when heated with ethyl alcohol and a trace of acid fails to form the ester.
 - (v) Amides are much weaker bases than amines.

 $(5 \times 2 = 10 \text{ marks})$

 $[2 \times 10 = 20 \text{ marks}]$

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FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, NOVEMBER 2016

(UG-CCSS)

			UUT-UU	
			Chemist	ry
		CH 5B 11—PF	IYSICAL	CHEMISTRY-II
Thr	ee Hour	°S		Maximum: 30 Weightage
Ans	swer all	the twelve questions. Each	question (carries a weightage of 1/4.
1	Which	of the following defects if pr	resent wil	l reduce the density of a crystal?
	(a)	Frenkel.	(b)	Schottky.
	(c)	Edge dislocation.	(d)	All these.
2	Sodiur	n chloride belongs to the cry	stal syste	\mathbf{m} :
	(a)	Cubic.	(b)	Hexagonal.
	(c)	Tetragonal.	(d)	Orthorhombic.
3	Which	of the following belongs to	C _{3v} point	groups?
	(a)	SO_3 .	(b)	BBr_3 .
	(c)	NH ₃ .	(d)	AlCl ₃ .
4	Which	of the following molecule or	r ion has I	D ₃ h symmetry?
	(a)	H ₃ O ⁺ .	(b)	CHCl ₃ .
	(c)	CO_3^{2-} .	(d)	NF ₃ .
5	The el	ectronic spectra lie within –		
	(a)	Infrared region.	(b)	Visible or uv- region.
	(c)	Radio wave region.	(d)	Microwave region.
6	Which	of the following compounds	is freque	ntly used as the internal reference in proton nmr
	spectr	oscopy:—		
	(a)	TNS.	(b)	DMF.
	(c)	TMS.	(d)	DMSO.

1	I'ne s	um of mole fractions of A	and B in a s	system containing 0.2 moles each of A and B is:
	(a)	0.6.	(b)	0.2.
	(c)		. (d)	Unpredictable.
8		ning complete dissociation ling point?	a, which of t	he following solution exhibits maximum elevation
	(a)	0.1 molar NaCl.	(b)	0.1 molar CaCl ₂ .
	(c)	0.1 molar BaCl ₂ .	(d)	0.1 molar FeCl ₃ .
9	A mix	ture of two miscible liquic	ls has the n	umber of phases equal to:
	(a)	Zero.	(b)	One.
	(c)	Two.	(d)	Three.
10	For on	e component system, at ti	iple point th	ne number of degrees of freedom is:
		Zero.		One.
	(c)	Two.	(d)	Three.
11	The ac	dsorption of hydrogen on o	charcoal is:	
	(a)	Physical adsorption.	(b)	Chemical adsorption.
	(c)	Sorption.		Activated adsorption.
12	The ef	ficiency of an adsorbent in		
		Viscosity.		Surface tension.
	(c)	Surface area.		Number of ions.
				$(12 \times \frac{1}{4} = 3 \text{ weightage})$
Ansv	ver all	the nine questions. Each	question ca	
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		centre of symmetry.		
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16 How many fundamental vibrational frequencies would you expect for CO₂ molecule? How do

you represent these modes?

17 State mutual exclusion principle.

- 18 Draw schematically the phase diagram of water and apply phase rule on it.
- 19 What is a condensed system? Write the reduced phase rule equation.
- 20 Calculate the osmotic pressure of an aqueous solution containing 20 g of glucose per litre of the solution at 25°C.
- 21 Write the difference between gel and emulsion.

 $(9 \times 1 = 9 \text{ weightage})$

- III. Answer any five questions. Each question carries 2 weightage.
 - The pure rotational spectrum of gaseous HCl consists of a series of equally spaced lines separated by 20.80 cm⁻¹. Calculate moment of inertia of the molecule.
 - 23 Draw the diagrams to represent f.c.c, b.c.c. and simple cube lattices.
 - 24 What are the different types of symmetry elements and symmetry operations of molecules?
 - 25 State with suitable potential energy curve diagrams the Frank condon principle in the vibrational spectrum of a diatomic molecule.
 - 26 Equimolar solutions of sucrose and sodium chloride in water are not isotonic. Why?
 - 27 Write the principle of steam distillation.
 - 28 Write any two methods for the purification of colloids.

 $(5 \times 2 = 10 \text{ weightage})$

- IV. Answer any two questions. Each question carries four weightage.
 - 29 What are liquid crystals? Write a note on different types of liquid crystals.
 - 30 (a) Draw a vapour pressure composition curve showing deviation from Raoult's law and explain it.
 - (b) The fundamental vibrational frequency of HCl is 2890 cm^{-1} . Calculate the force constant of the molecule. The atomic masses are $^{1}\text{H} = 1.673 \times 10^{-27} \text{ kg}$, $^{35}\text{Cl} = 58.06 \times 10^{-27}$.
 - 31 (a) Derive the Gibbs adsorption isotherm for the adsorption of solute on the surface of a liquid.
 - (b) With the help of phase diagram explain $Kl-H_2O$ system.

 $(2 \times 4 = 8 \text{ weightage})$

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS-UG)

Chemistry/Polymer Chemistry/Industrial Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY—II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. Name an internal reference used in NMR spectroscopy.
- 2. Express wave length of a radiation 10 Å in centimeter unit.
- 3. Give an example for a molecule belonging to C_{3V} point group.
- 4. A shift towards shorter wave length in the electronic spectral absorption is called ————.
- 5. Mention the number of phases present in mixture of He_2 , O_2 and N_2 .
- 6. The unit zero order reaction is ______.
- 7. The condition for a molecular to give rotational spectrum is ______.
- 8. The minimum vibrational energy of a molecule is ______.
- 9. Give an example for a symmetric top molecules.
- 10. Name a non-radiative transition.

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. What are protective colloids? Give one example.
- 12. Explain efflorescence with an example.
- 13. What is congruent melting point? Give one example.
- 14. Explain Hardy Schulze rule with suitable example.
- 15. Explain improper axis of rotation with an example.
- 16. Can the activation energy of a reaction by zero or negative? Explain your answer.
- 17. Define molar extinction coefficient. What is its significance?
- 18. Distinguish between order and molecularity.
- 19. What is meant by zero order reaction? Give one example.

- 20. What is meant by half life time of a reaction? Give the expression for the half life time of a first order reaction.
- 21. The half life time of a first order reaction is 470 s. Calculate the rate constant for the reaction.
- 22. What is Born-Oppenheimer approximation?

Section C

Answer any five questions. Each question carries 6 marks.

- 23. Discuss the use of half life method for the determination of order of a reaction.
- 24. Derive Langmuir adsorption isotherm. How will you correlate it with Freundlich isotherm?
- 25. Explain gas chromatography.
- 26. Explain briefly the origin of Raman spectroscopy.
- 27. What is Zeta potential?
- 28. Discuss Patinsons process of desilverisation of lead.
- 29. Briefly explain the theory of ESR spectroscopy.
- 30. Derive an expression for a second order reaction.

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

Section D

Answer any two questions. Each question carries 10 marks.

- 31. (a) Explain the theory of NMR spectroscopy.
 - (b) Discuss the effects of temperature and catalyst on rate of reaction.

(5 + 5 = 10 marks)

- 32. (a) Derive Nernst distribution law. Mention important applications of the law.
 - (b) Calculate the reduced mass and moment of inertia of ⁷⁹BrCl³⁵ molecule. The bond length of the molecule is 0.214 nm.

(6 + 4 = 10 marks)

- 33. (a) What are the postulates of collision theory? Using the theory, derive an expression for the rate of a bimolecular reaction.
 - (b) Write a note on applications of colloids.
 - (c) Explain electrophoresis.

(5 + 3 + 2 = 10 marks)

- 34. (a) Discuss the Lindemann theory of unimolecular reactions.
 - (b) Write a note on high performance liquid chromatography.
 - (c) Write a note on chemiluminescence.

(5 + 3 + 2 = 10 marks)

 $[2 \times 10 = 20 \text{ marks}]$

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS—UG)

Chemistry

CHE 5B 07-ORGANIC CHEMISTRY-II

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark

- 1. A mixture of anhydrous ZnCl₂ and HCl is known as ———.
- 2. M-Dinitrobenzene on reduction with ammonium sulphide gives ———.
- 3. Phenol on Kolbe's reaction gives ——.
- 4. 2-Methyl 2-butanol on treating with concentrated H₂SO₄, the major product obtained will be ———.
- 5. The major product obtained by reacting Nitrous acid with dimethyl amine is ———.
- 6. Complete the following reaction:—

Bezhophenone oxime (i) H₂SO₄

(ii) H₂O

- 7. The major product obtained by treating o-bromoanisole with sodamide is ______.
- 8. Ethanamide on treating with Br2 in presence of NaOH gives ———
- 9. Diethyl Zinc is it known as -----
- 10. Reduction of Ethanoyl chloride with Pd/BaSO4 yields _____.

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

Section B

Answer any ten questions. Each question carries 2 marks.

- 11. Explain E2 reaction with an example.
- 12. Explain Perkins reaction.
- 13. Compare the relative acidity of p-Methoxy benzoic acid and p-Nitrobezoic acid. Justify your answer
- 14. How is eosin prepared?

- 15. Outline the method to prepare saccharin from toluene.
- 16. Represent a sequence of reaction involving the conversion of propanoic acid to ethanoic acid.
- 17. Explain Blanc's rule.
- 18. What is Iodoform test?
- 19. What is trans esterification? Give an example.
- 20. What is MPV reduction? Give an example.
- 21. Why is phenol acidic while alcohol is neutral?
- 22. How is Indole synthesised?

Section C

Answer any five questions. Each question carries 6 marks

- 23. (a) What is Hoffman's bromamide reaction.
 - (b) Describe the Hinesburg method of separation of primary, secondary and tertiary amines from their mixture.
- 24. (a) Give two reactions of alkyl lithium to show its synthetic applications.
 - (b) How are the following compounds prepared?
 - (i) 2-Methyl 2-butanol from 2-propanol; and (ii) Acetaldehyde to Crotonic acid.
- 25. (a) Discuss the various products obtained by the reduction of nitro benzene in acidic, basic and neutral media.
 - (b) What is Perkins reaction?
- 26. (a) How is vanillin prepared? Mention two important uses of vanillin.
 - (b) How are NaBH4 and LiAIH4 react with C6H5CH = CH CHO?
 - (c) What is Benzoin condensation?
- 27. (a) Discuss addition elimination mechanism of aromatic nucleophilic substitution reactions? Give the evidence in support of this mechanism
 - (b) Would you expect 1-bromo 2-methylbutane to be more / less active than 1-bromo 3-methylbutane in SN2 reaction? Explain.

- 28. (a) Give two reactions of alkyl lithium to show its synthetic applications.
 - (b) Electrophilic substitution of pyrrole takes place at 2-position, whereas in pyridine at 3-position. Comment.
- 29. (a) Discuss the orientation of substituent groups around the multiple bond in an elimination reaction.
 - (b) Discuss the stereochemical aspect of SN2 and SN1 reactions.
- 30. (a) What is Victor Mayer test?
 - (b) Predict the major product and Discuss the mechanism of the following reaction:--

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

Section D

Answer any two questions. Each question caries 10 marks.

- 31. Illustrate the mechanism of the following reactions:—
 - (a) Cannizarro reaction.
 - (b) Riemer Tiemann reaction.
 - (c) Claisen rearrangement.
 - (d) Beckmann rearrangement.
 - (e) Aldol condensation.

 $(5 \times 2 = 10 \text{ marks})$

- 32. (a) How is Glycine obtained by Gabriel Pthalimide synthesis.
 - (b) Explain how are primary secondary and tertiary amines react with nitrous acid.
 - (c) Discuss the principle underlying the estimation of urea by hypobromite method
 - (d) How is semi carbazide prepared.

(2 + 3 + 3 + 2 = 10 marks)

33. Explain why?

- (a) Meta nitro benzoic acid is a weaker acid than para nitro benzoic acid.
- (b) 2, 6-Dimethyl benzoic acid, when heated with ethyl alcohol and a trace of acid fails to form the ester.
- (c) Amides are much weaker bases than amines
- (d) Neopentyl chloride (CH₃)3CCH2Cl, a primaryalkyl halide does not participate in typical SN2 reaction.
- (e) Vinyl Chloride does not give nucleophilic substitution reaction.

$$(5 \times 2 = 10 \text{ marks})$$

34. (a) How is Ethyl acetoacetate prepared? Discuss two important synthetic application of Ethyl acetoacetate.

$$(2 + 3 = 5 \text{ marks})$$

- (b) How is Benzene diazonium Chloride prepared? Starting from Benzene diazonium Chloride how are the following compounds synthesised
 - (i) Benzoic acid; and (ii) Nitro benzene.

$$(2 + 1\frac{1}{2} + 1\frac{1}{2} = 5 \text{ marks})$$

$$[2 \times 10 = 20 \text{ marks}]$$

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FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS-UG)

Chemistry/Polymer Chemistry

CHE 5B 06-INORGANIC CHEMISTRY-III

Time: Three Hours

Maximum: 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

- 1. Give any one property which resembles hydrogen with halogen.
- 2. Why are the carbonates of alkali metals highly stable to heat?
- 3. What is the formula of Plaster of Paris?
- 4. Nitrogen cannot form pentahalide, why.
- 5. Which element of group 16 is associated with xerography?
- 6. Name any two common air pollutants.
- 7. The most abundant element in the universe is ——.
- 8. Indicator type silica gel used as a dehumidifer contains ——— ions.
- 9. Borazole is known as——.
- 10. The closeness of a measurement to the true value is called ——.

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

Section B

Answer any ten questions.

Each question carries 2 marks.

- 11. What is meant by biodegradability?
- 12. What are different types of indeterminate errors?
- 13. With a suitable example, explain common ion effect.
- 14. What are interhalogen compounds? Give examples.
- 15. How is photochemical smog formed?
- 16. What are pseudo halogen compounds? Give an example.
- 17. How does COD differ from BOD?
- 18. HF is a liquid while HCl is a gas. Explain.

- 19. What is glass transition temperature of polymer? Why is it called so?
- 20. BF3 is a weaker Lewis acid than BCl3 and BBr3. Why?
- 21. What are different types of phosphorus based chain polymers?
- 22. Strong oxidising agents do not exist in liq.NH3. Why?

Section C

Answer any five questions. Each question carries 6 marks.

- 23. Write a note on the sources and consequences of radioactive pollution.
- 24. Give the structure of oxy acids of phosphorous. Compare their acidity.
- 25. Explain the terms ionization energy, catenation and electronegativity.
- 26. Give the methods of preparation, properties and uses of diborane.
- 27. Explain the terms co-precipitation and post-precipitation. Suggest methods to avoid these.
 - 28. What are the chemical reactions of liquid ammonia?
 - 29. Write a note on noise pollution.
 - 30. Write a brief description of fluorides of krypton and radon.

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

Section D

Answer any two questions. Each question carries 10 marks.

- 31. Discuss the variation in properties of group 13 elements with reference to:
 - (i) Oxidation state.

(ii) Catenation.

(iii) Electronegativity.

- (iv) Metallic character.
- (v) Ionisation energy?

 $(5 \times 2 = 10 \text{ marks})$

32. (a) Discuss pollution of water with respect to source effects and prevention.

(6 marks)

(b) What are the different between classical smog and photochemical smog?

(4 marks)

- 33. (a) Describe the structure of pyrosilicates and three dimensional silicates.
 - (b) Describe the structure and uses of any two phosphorous based polymers.
- 34. (a) Name the important oxyacids of chlorine and give their molecular formula.

(3 marks)

(b) Write the characteristics of solutions of alkali metals in liq.NH3.

(4 marks)

(c) Explain the geometry of XeF, and XeOF, based on the hybridization.

(3 marks)

 $[2 \times 10 = 20 \text{ marks}]$

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(CUCBCSS-UG)

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