MANAV RACHNA UNIVERSITY
Declared as State Private University vide Haryana Act 26 of 2014

DEPARTMENT OF CHEMISTRY
End term Examination January 2023

SEMESTER	**Ist**	**DATE OF EXAM**	**23-01-2023**
SUBJECT NAME	**Environmental Sciences**	**SUBJECT CODE**	**CHH137**
BRANCH	**B.Sc. B.Ed./B.A. B.Ed.**	**SESSION**	**I**
TIME	**09:00 AM to 11:00 AM**	**MAX. MARKS**	**50**
PROGRAM	B.Sc. B.Ed / B.A. B.Ed	**CREDITS**	**4**
NAME OF FACULTY	**Dr Meena Kapahi**	**NAME OF COURSE COORDINATOR**	**Dr Meena Kapahi**

Note: All questions are compulsory. Marks are indicated against each question.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(A)	**In a population pyramid, the vertical axis is represents** i. Male population ii. Female population iii. Age groups of population iv. Total number of population	1	CO2	L1	
	Q1(B)	**Choose the correct statement** i. Ozone is a pollutant in the stratosphere. ii. Ozone saves us from UV rays in the stratosphere and is a pollutant in our immediate environment iii. CO_2 is responsible for stratospheric ozone layer depletion iv. None of the options	1	CO2	L2	
	Q1(C)	**Thermal pollution is a kind of** i. Water pollution ii. Air pollution iii. Soil pollution iv. None of the above	1	CO2	L1	
	Q1(D)	**Which statement is correct?** i. A large proportion of children in a population is a result of high life expectancy ii. A large proportion of children in a population is a result of high birth rates iii. A large proportion of children in a population is a result of high replacement level iv. A large proportion of children in a population is a result of high death rates	1	CO2	L2	
	Q1(E)	**Which of the following is a renewable source of energy?** i. Ocean currents ii. Solar energy	1	CO2	L1	

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		iii. Biomass iv. All of the above				
	Q1(F)	**Which of the following is not a primary pollutant?** i. Oxygen ii. Ground-level ozone iii. Carbon monoxide iv. Carbon dioxide	1	CO4	L2	
	Q1(G)	**Assertion:** Polythene bags and plastic containers are non-biodegradable substances. **Reason:** They can be broken down by microorganisms in natural simple harmless substances. i. Both 'A' and 'R' are true and 'R' is correct explanation of the Assertion. ii. Both 'A' and 'R' are true but 'R' is not correct explanation of the Assertion. iii. 'A' is true but 'R' is false. iv. 'A' is false but 'R' is true. **Select the appropriate choice from the (i) - (iv)**	1	CO3	L1	
	Q1(H)	**An extensive number of chains interlinked in an ecosystem forms a:** i. Food chain ii. Food web iii. Carbon cycle iv. Nitrogen cycle	1	CO2	L1	
	Q1(I)	**Botanical garden is an example of:** (i) Ex-situ conservation (ii) In-situ conservation (iii) Both of the above (iv) None of the above	1	CO2	L2	
	Q1(J)	**Which of the following is an example of biotic resource?** (i) Coal (ii) Crude oil (iii) Biogas (iv) All of the above	1	CO2	L2	
PART-B	Q2	Briefly explain the structure of an ecosystem. Discuss.	2.5	CO3	L1	
	Q3	In order to solve/tackle environmental issues and provide complete solutions, we require a multidisciplinary approach. Comment giving suitable examples (at least 2).	5	CO4	L3	
	Q4	What are the necessary actions we should take when floods are predicted?	5	CO2	L4	
	Q5	What are the effects of thermal pollution? What measures would you suggest to control water pollution around you?	2+3 =5	CO3	L1	
	Q6	Differentiate between species diversity and ecological diversity.	2.5	CO3	L2	
RT-	Q7	How does agriculture run-off effect ecosystems? How does this change move through the food web?	2+3 =5	CO2	L1	

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	Q8	What are the causes and effects of global warming?	5	CO3	L3	
	Q9	Which of the following according to you is the major cause for loss of biodiversity amongst the four main causes of loss of biodiversity (Habitat loss and fragmentation, alien species invasion, over-exploitation and co-extinctions)? Justify your pick.	2.5	CO3	L3	
	Q10	Explain the ecosystem service. Write any three ecosystem services rendered by the natural ecosystem.	2+3 =5	CO4	L3	
	Q11	What can we infer from the population pyramids? Explain.	2.5	CO4	L2	

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MANAV RACHNA Vidyanatariksha

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DEPARTMENT OF CHEMISTRY

"End Term Examination, Jan-2023"

SEMESTER	**I**	**DATE OF EXAM**	**16.01.2023**
SUBJECT NAME	**ATOMIC STRUCTURE & BONDING**	**SUBJECT CODE**	**CHH135-T**
BRANCH	**Education**	**SESSION**	**2022-2023 (I)**
TIME	**9:00 am to 12:00 noon**	**MAX. MARKS**	**80**
PROGRAM	**B.Sc B.Ed**	**CREDITS**	**3**
NAME OF FACULTY	**Dr. Harsha Devnani**	**NAME OF COURSE COORDINATOR**	**Dr. Harsha Devnani** Arpit Sand

Note: Part A : All questions are compulsory.
Part B: Attempt any three questions.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	The radius of cation is invariably smaller and that of an anion invariably larger than that of the corresponding atom. Why?	4	CO2	BT3	
	1(B)	Define electronegativity, how it is related to electron affinity and ionization energy, why?	4	CO3	BT2,3	
	1(C)	What are weak interactions and their types?	4	CO4	BT1	
	1(D)	Discuss the effect of lone pair and electro negativity on the shape of the molecule and bond angle?	4	CO2	BT2	
	1(E)	Discuss the major setback of Bohr's theory.	4	CO1	BT1	
PART-B	Q2(A)	Explain the following defects with the help of diagrams: 1. Frenkel Defect 2. Schottky Defect	10	CO4	BT2	
	2(B)	Discuss the geometry and shape of following molecules as per Valence Shell Electron Pair Repulsion (VSEPR) theory: 1. SF_4 2. CLF_3	10	CO4	BT4	

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Q3(A)	What is lattice energy? Derive Born-Lande equation for the lattice energy of an ionic solid.	10	CO4	BT2	
3(B)	Predict the bond order in C_2 molecule with the help of Molecular energy level diagram?	10	CO5	BT3,4	
Q4	Write the electronic configuration of NO molecule with the help of molecular orbital diagram and explain: A. What is the bond order of the molecule? B. Will the bond length be shorter or larger than in NO^+? C. How many unpaired electrons will be present in the molecule? D. What will be the bond order in NO^-?	20	CO5	BT4	
Q5(A)	What is coordination number? Calculate the coordination number of an atom in 1. a body centered cubic unit cell 2. a face centered cubic unit cell	10	CO4	BT2,3	
5(B)	What are semi-conductors? Depict the n-type and p-type semiconductors.	10	CO4	BT2	
Q6(A)	Draw neat diagram for NaCl structure and explain it.	10	CO5	BT2	
6(B)	Illustrate the VBT treatment of H_2 molecule.	10	CO5	BT3	

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DEPARTMENT OF CHEMISTRY

"T3 Examination, Jan-2023"

SEMESTER	**I**	**DATE OF EXAM**	**21.01.2023**
SUBJECT NAME	**Essentials of Chemistry**	**SUBJECT CODE**	**CHH 105B-T**
BRANCH	**Applied Sciences**	**SESSION**	**I**
TIME	**9:00 to 12:00 noon**	**MAX. MARKS**	**100**
PROGRAM	**BSc Physics**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Shilpa Sharma**	**NAME OF COURSE COORDINATOR**	**Dr. Shilpa Sharma** Arpitsam d

Note: All questions are compulsory.
Scientific Calculator is allowed
All questions in Part A and Part B are Compulsory

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A)	Define the following: (a) Pauli's Exclusion Principle (b) Aufbau Principle (c) End point (d) Equivalence point	4	CO1	BT1
	1(B)	Calculate the CFSE for the following complex: $[CoCl_4]^{2-}$	6	CO1	BT2
PART-B	Q2(A)	What is the number of moles of solute in 250 ml of a 0.4M solution.	4	CO2	BT2
	2(B)	Describe Complexometric titration in detail	3	CO3	BT2
	Q3(A)	What designations are given to the orbitals having (i) n=2, l=1(ii) n=2, l=0 (iii) n=4, l=3 (iv) n=4, l=2 (v) n=1, l=1	3	CO1	BT2
PART-C	Q4(A)	Estimate the pH at 25°C containing 0.10M sodium acetate and 0.03 M acetic acid.	6	CO4	BT3
	Q5(A)	(a) Derive the Henderson Hasselbalch equation (b) Estimate the pH at 25°C containing 0.10M sodium acetate and 0.02M acetic acid. pKa for CH_3COOH = 4.57	(6+4 =10)	CO4	BT3
	5(B)	(a) State and Explain Lowry-Bronsted Theory and Lewis Theory of acids and bases. In what way Bronsted different from Arrhenius Theory.	(6+4=10)	CO4	BT3

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		(b) Calculate the pH of 0.001M HCl			
	Q6(A)	The solubility of CuBr is found to be 2x 10^{-4} mol/l at 25^{0}C. calculate Ksp value for CuBr.	6	CO4	BT3
	6(B)	Derive Ostwald's Dilution Law	8	CO4	BT2
PART-D	Q7(A)	Define adsorption. Discuss the type of adsorption.	6	CO6	BT1
	7(B)	Define the following with examples: (a) Positive catalyst (b) Negative Catalyst (c) Heterogenous Catalyst (d) Sols	8	CO5	BT1
	Q8(A)	Discuss Langmuir's theory of adsorption. Deduce an expression for Langmuir's unimolecular adsorption isotherm.	8	CO6	BT2
	8(B)	Write the difference between gels and emulsions. Define Emulsions, its classifications and preparation.	5	CO6	BT2
	Q9(A)	Discuss the theories catalysis. Illustrate with examples.	8	CO5	BT2
	Q9(B)	Discuss Lock and Key theory of Enzyme catalysis.	5	CO6	BT2

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Department of Chemistry

"End Term Examination, Jan 2023"

SEMESTER	**I**	**DATE OF EXAM**	**21.01.2023**
SUBJECT NAME	**Analytical Chemistry**	**SUBJECT CODE**	CHH504B
BRANCH	**Chemistry**	**SESSION**	**I**
TIME	**3 hrs**	**MAX. MARKS**	**100**
PROGRAM	**M.Sc. Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Pradeep K. Varshney**	**NAME OF COURSE COORDINATOR**	**Dr. Pradeep K. Varshney** Approved

Note: Attempt all questions.

Part /Q.No.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A: All the questions are Compulsory.			**(4x5=20 Marks)**			
PART-A	Q.1	Why Hyphenated techniques are preferred over conventional techniques. Explain.	4	CO4	BT4	1.4.1, 3.1.1
	Q.2	What is the role of reference electrode in Potentiometry? How will you explain equivalence point.	4	CO2	BT4	3.2.2
	Q.3	What is Bond order? Calculate the bond order of O_2, NO_3^- and O_2^- molecules.	4	CO2	BT3	3.2.2
	Q.4	How will you define an error ? How can you decide precision and accuracy in your experimental work?	4	CO3	BT3	3.2.3
	Q.5	Which analytical techniques you will use to do quantitative analysis of blood samples. Explain.	4	CO3	BT3	3.1.1
PART-B: All the questions are Compulsory.			**(4x5=20 Marks)**			
	Q.6	What are Auger electrons? Which surface chemical analysis is similar to Auger electron spectroscopy. Explain.	4	CO3	BT2	1.4.1, 1.4.3
PART-B	Q.7	How Computational Chemistry is useful for us. Write its applications.	4	CO2	BT4	3.2.2
	Q.8	Why does only a 'photon' show the photoelectric effect? Justify your answer.	4	CO2	BT2	1.4.1, 1.4.3
	Q.9	Write the name of first instrumental analysis developed by Robert Bunsen and Gustav Kirchhoff and who discovered Analytical Chemistry approach	4	CO1	BT1	1.4.1

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		the first time.				
	Q.10	X-rays are electromagnetic radiation of higher energy compared to visible light. If you could see X-rays in the same way you can see light would they appear brighter than light ? Explain.	4	CO3	BT3	1.4.1, 1.4.3

PART-C: Attempt <u>any three</u> questions. Each question is of 10 Marks. (10x3=30 Marks)

PART-C	Q.11	Explain the working principle of atomic emission spectroscopy using block diagram. How AES is different from AAS. Write demerits of AAS?	10	CO3	BT2	3.1.3, 3.2.2
	Q.12	Briefly describe different types of hyphenated techniques used with mass spectrometry. What essential requirements must be satisfied in a good interface to the mass spectrometer ? Explain.	10	CO4	BT4	3.1.3, 3.2.2
	Q.13	What is the Mossbauer Effect? What information we can get from Mossbauer spectra. Write its applications and demerits.	10	CO3	BT3	3.1.3, 3.2.2
	Q.14	Explain the principle of GC-MS with the help of block diagram.Write limitations of GC-MS. How GC-MS is different from LC-MS.	10	CO3	BT4	3.1.3, 3.2.2

PART-D: Attempt <u>any three</u> questions. Each question is of 10 Marks. (10x3=30 Marks)

PART-D	Q.15	Write Principle, construction, working & applications of SEM. How it is different from TEM and STM ?	10	CO3	BT3	3.1.3, 3.2.2
	Q.16	Explain with comparison why ICP-OES provides fast and better results as compared to ICP-AES and ICP-MS.	10	CO3	BT3	3.1.1, 3.2.2
	Q.17	Wite major differences between OM, SEM and TEM. Which analytical technique is used to study the samples at atomic level. Explain	10	CO3	BT3	3.1.1, 3.2.2
	Q.18	If you are working in a pharama company as a Manager. Your manangement has asked to expand company business in other states. What would be your business model to double the profit in next 5 years.	10	CO4	BT5	1.4.1, 3.1.1

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DEPARTMENT OF CHEMISTRY

"End Term Examination, Jan-2023"

SEMESTER	**I**	**DATE OF EXAM**	**19/01/2023**
SUBJECT NAME	**Physical Chemistry-I**	**SUBJECT CODE**	**CHH501B**
BRANCH	**M.Sc. (Chemistry)**	**SESSION**	**I**
TIME	**9:00 to 12:00**	**MAX. MARKS**	**100**
PROGRAM	**M.Sc. Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Arpit Sand**	**NAME OF COURSE COORDINATOR**	**Dr. Arpit Sand** Arpit Sand

Note: Note: Part A&B : All questions are compulsory. Questions will be of short answer type.
Part C &D: Questions will be of descriptive type or numerical.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	What is meant by mean activity coefficient of a solution? Calculate the ionic strength of a solution prepared by mixing 50 ml 0.2 M KNO_3, 20 ml 0.15 M K_2SO_4, 30 ml 0.05 M $Cu(NO_3)_2$.	7	CO1	BT2	
	1(B)	Give an account for Debye Huckel equation for dilute electrolyte solution and deduce its expression.	8	CO1	BT3 BT4	
	1(C)	Discuss Gouy Chapman Diffusion Model with figure	2	CO1	BT3	
PART-B	Q2(A)	Discuss thermodynamics approach to CMC	6	CO2	BT3	
	2(B)	Discuss Electro-osmosis pressure and streaming current with the help of diagram	6	CO2	BT3	
	2(C)	Write a short note on surface active agents	6	CO2	BT3	
PART-C	Q3(A)	Deduce Expression for time independent Schrodinger wave equation	6	CO3	BT3	
	3(B)	Proof that $\frac{\partial^2\emptyset}{\partial\epsilon^2} - 2\epsilon\frac{\partial\emptyset}{\partial\epsilon} + (\frac{\alpha}{\beta} - 1) = 0$	7	CO3	BT3	
	Q4(A)	Write a short note on ladder operator	5	CO3	BT3	

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	4(B)	Discuss any 5 postulates of quantum chemistry	5	CO3	BT3	
	Q5(A)	If $\hat{A}$ and $\tilde{E}$ are the two operators such that $[\hat{A}, \tilde{E}] = 1$ show that $[\hat{A}, \tilde{E}^2]=2\tilde{E}$	5	CO3	BT3 BT4	
	5(B)	Draw energy level diagram 1D Box	5	CO3	BT3	
PART-D	Q6(A)	Proof that $< \psi \|H\| \psi > \geq 0$	8	CO4	BT3 BT4	
	6(B)	Discuss Rodrigues formula for the Hermit polynomials.	8	CO4	BT3	
	Q7(A)	Write a short note on Huckel approximation in unsaturated molecules	5	CO4	BT4	
	7(B)	Discuss application of variation method in one dimensional box	5	CO5	BT3	
	7(c)	Discuss application of perturbation method in Perturbed harmonic oscillator	6	CO5	BT3	

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DEPARTMENT OF CHEMISTRY

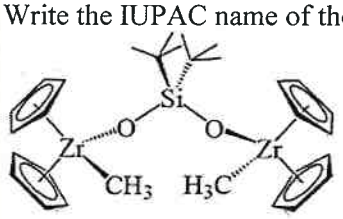
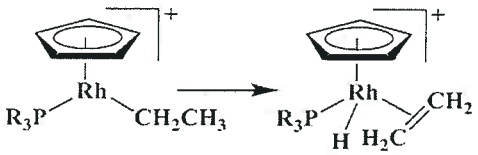
"End Term Examination, Jan-2023"

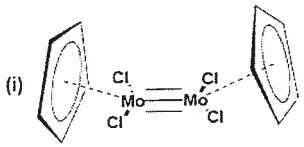
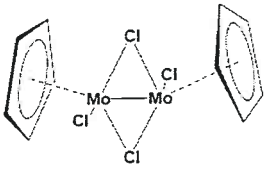
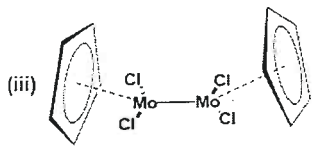
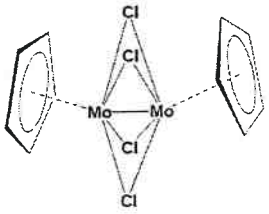
SEMESTER	I	DATE OF EXAM	16.01.2023
SUBJECT NAME	Inorganic Chemistry-I	SUBJECT CODE	CHH502B
BRANCH	Chemistry	SESSION	I
TIME	9:00 am – 12:00 noon	MAX. MARKS	100
PROGRAM	MSc	CREDITS	4
NAME OF FACULTY	Dr. A. Jayamani	NAME OF COURSE COORDINATOR	Dr. A. Jayamani

***Note**: All questions are compulsory.*

Arpit Sand

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	How CFSE calculations are beneficial in identifying the type of a spinel?	2	CO1	BT3	
	1(B)	Write down the nephelauxetic series of metals	2	CO1	BT1	
	1(C)	How to find the Jahn-Teller Stabilization Energy for any complex.	2	CO1	BT2	
	1(D)	Write any two postulate of molecular orbital theory.	2	CO1	BT3	
	1(E)	Explain why OH^- ion is having the position before H_2O ligand in the spectrochemical series on the basis of MOT.	2	CO1	BT1, BT2	
PART-	2(A)	What is spin multiplicity?	2	CO2	BT1	
	2(B)	Why do we obtain band instead of sharp peak in electronic spectra of coordination compounds?	2	CO2	BT3	

	2(C)	Based on Orgel diagram, mention the ground state of $[Cu(H_2O)_6]^{2+}$ and $[CuCl_4]^{2-}$ (tetrahedral)	2	CO2	BT3	
	2(D)	If a complex is found to have Δ_o/B value of 15 and Racah Parameter B of 400 cm^{-1}, Calculate the magnitude of splitting in Dq.	2	CO2	BT4	
	2(E)	Mention different types of charge transition bands	2	CO2	BT3	
PART-C	Q3(A)	Write the IUPAC name of the following compound 	5	CO3	BT3	
	3(B)	Draw the structure of dichlorido(η^6-p-cymene)[tris(4-methoxyphenyl)propane]ruthenium(II)	5	CO3	BT3	
	Q4(A)	How organometallic compounds are classified? Give examples for each.	8	CO3	BT1	
	4(B)	The following transformation is an example of  i) oxidative addition ii) insertion iii) β-hydride elimination iv) reductive elimination	2	CO3	B2	
	Q5(A)	Explain oxidative addition and reductive elimination reactions of organometallic compounds with examples.	5	CO3	BT4	
	5(B)	$[CpMoCl_2]_2$ obeys the 18 electron rule, the correct structure of this compound is (atomic no. of Mo 42)	3	CO3	BT3	

		(i)  (ii)  (iii)  (iv) 				
	5(C)	Which of the following complex will follow 18-electron rule? (i)$(\eta^5\text{-}C_5H_5)Fe(CO)_2$ (ii) $(\eta^5\text{-}C_5H_5)_2Mo(CO)_3$ (iii) $(\eta^5\text{-}C_5H_5)_2Re(\eta^6\text{-}C_6H_6)$ (iv) $(\eta^5\text{-}C_5H_5)_2Co$	2	CO3	BT4	
	Q6(A)	Write short notes on σ-bonded and π-bonded organometallic compounds	4	CO3	BT1, BT2	
	6(B)	Draw the mechanism for hydrogenation and hydroformylation reactions using an organometallic catalyst for each.	6	CO3	BT2, BT3	
PART-D	Q7(A)	Write short notes on the classification of metal carbonyls based on number of metal atom and based on nature of bonding.	6	CO4	BT1	
	7(B)	Describe in detail about the factors affecting back bonding in metal carbonyls	4	CO4	BT2	
	Q8(A)	How are metal carbonyls prepared? Explain any three methods with reactions	6	CO4	BT1	
	8(B)	Which of the following provides experimental evidence for π-back donation in a metal carbonyl complex such as $[Fe(CO)_5]$? i) The CO molecule has a vacant π* MO. ii) The C–O bonds in the complex are shorter than in free CO. iii) Covalent Fe–C bonds are present in the complex. iv) The wavenumbers corresponding to the C–O stretches in the complex are lower than that for free CO.	2	CO4	BT3	
	8(C)	Which statement is incorrect about CO ligands (i) A CO ligand can accept electron into its π* molecular orbital, this weakens the CO band (ii) CO ligands can adopt terminal, μ and μ^3 bonding modes, the amount of backdonation depends on the bonding mode (iii) In IR spectra of $Fe(CO)_5$, the absorptions assigned to M-CO stretching are at higher wavenumber than that of free CO (iv) fluxional behaviour is common in metal carbonyl compounds and can be investigated by ^{13}C NMR spectroscopy	2	CO4	BT3	

	Q9(A)	Justify how vibrational spectra helpful in elucidating the structure of metal carbonyls	6	CO4	BT2	
	9(B)	If the IR stretching frequencies of complex $[Ni_2(\eta^5\text{-}Cp)_2(CO)_2]$ appear at 1857 cm^{-1}(s) and 1897 cm^{-1}(w), what will be the nature of two M-CO bonds?	4	CO4	BT3	
	Q10(A)	Write down the distinct features of phosphine ligands	4	CO4	BT1	
	10(B)	Which complex among $Ni(CO)_3PMe_3$ and $Ni(CO)_3PF_3$ will have the higher CO stretching frequency? Explain in detail with illustrations for identifying the compound that has stronger M-CO bond?	6	CO4	BT4	

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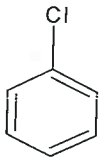
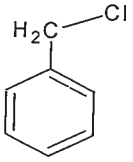
DEPARTMENT OF Chemistry

"T3 Examination, Jan 2023"

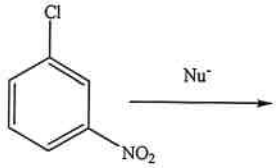
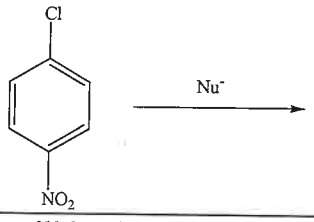
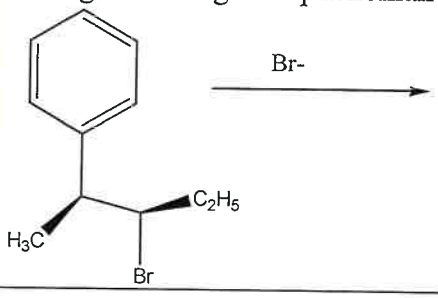
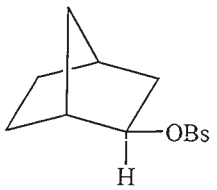
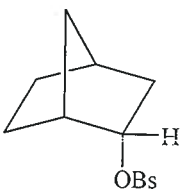
SEMESTER	**I**	**DATE OF EXAM**	**13.01.2023**
SUBJECT NAME	**Organic Chemistry-I**	**SUBJECT CODE**	**CHH503B**
BRANCH	**Chemistry**	**SESSION**	**I**
TIME	**3.0 hrs**	**MAX. MARKS**	**100**
PROGRAM	**MSc Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. S.K. Shukla**	**NAME OF COURSE COORDINATOR**	**Dr. S.K. Shukla**

Note: All questions are compulsory.

Arpit Saini

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	Why the singlet carbene react with alkenes stereospecifically where as triplet carbene reacted non-stereospecifically. Explain with suitable chemical reaction.	6	CO1	BT4	1.2.1
	Q2	What is the effect of resonance on the stability of carbocation. Expalin with suitable example	5	CO1	BT2	1.2.1
	Q.3	Triaryl carbonium ion is more stable than tri alkyl carbonium ion. Explain with its detailed chemical representations.	6	CO1	BT4	1.2.1
PART-B	Q4	Explain SNi' mechanism with suitable example	6	CO2	BT1	1.2.2
	Q5	Explain product spread with a suitable example	6	CO2	BT2	5.1.1
	Q6	Which of the following compound gives nucleophilic substitution reaction. Explain with detailed reasoning (a)  (b) 	6	CO2	BT3	5.1.1
PART-C	Q7	Explain the bromination of the benzene with the help of the formation of π-complex formatiom	6	CO3	BT-2	5.1.1
	Q.8	Why the pyrole favours the attack of electrophile on 2-position over 3-position.	6	CO3	BT4	1.2.3
	Q.9	Explain unimolecular Aromatic neucleophilic substitution radical mechanism	5	CO3	BT2	1.2.3
	Q.10	Write a short note on IPSO substitution	6	CO3	BT1	5.1.3

364

	Q11	Explain the addition elimination reaction in brief. Which of the following is more facilitated for the nucleophilic aromatic substitution reaction and why?. Explain in detail (i)  (ii) 	10	CO3	BT3	5.1.1
PART-D	Q.12	What will be the product (s) of the following reaction if it undergoes through the phenonian ion formation. 	6	CO4	BT4	5.1.1
	Q13	Why mustard gas shows its increased toxicity. Explain with the chemical reaction involved.	4	CO4	BT3	1.1.1
	Q14	Define the term neighbouring group participation. Explain the neighbouring group participation of oxygen through negative charge acquired by them in alkaline system.	8	CO4	BT1	1.2.1
	Q.15	Why the Exo-2-norbornyl brosylate gives 350 times faster acetolysis reaction than its corresponding eno product. Explain with detailed mechanism involved in both the reactions (a)  Exo-2-norbornyl brosylate (b)  Endo-2-norbornyl brosylate	8	CO4	BT4	5.1.1
	Q.16	Why the neopentyltosylate gives cyclic product along with rearranged product in solvolysis reaction. Explain with detailed mechanism	6	CO4	BT3	5.1.1

********** END **********

365

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DEPARTMENT OF Chemistry

"T3 Examination, Jan2023"

SEMESTER	**I**	**DATE OF EXAM**	**13.01.2023**
SUBJECT NAME	**Green Chemistry**	**SUBJECT CODE**	**CHH101B-T**
BRANCH	**Chemistry**	**SESSION**	**I**
TIME	**3.0 hrs**	**MAX. MARKS**	**100**
PROGRAM	**BSc(H) Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. S.K. Shukla**	**NAME OF COURSE COORDINATOR**	**Dr. S.K. Shukla**

***Note**:All questions are compulsory.*

Arpit Sand

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	0.8 grams of butanol reacts with 1.5 g of sodium bromide and 2.5 g of sulphuric acid to yield 12 g of butyl bromide. Calculate the % yield, atom economy. 	6	CO1	BT3	5.1.1
	Q2	What is E factor? Calculate the E-factor of a reaction where 30 grams of substrate is reacted with 28 grams of the reagent resulting the 41 grams product formation.	5	CO1	BT3	1.1.1
	Q3	Write a detailed note on Green chemistry Principle 9# Catalysis with a suitable example	6	CO1	BT2	5.1.1
PART-B	Q4	Write a note on: (i) Biodegradable polymer (ii) Particulate composites	8	CO2	BT1	1.2.1
	Q5	Explain the constituent of the composites in detail	10	CO2	BT4	1.2.1
PART-C	Q6	A water sample was alkaline for both phenolphthalein and methyl orange. 50 ml of this water sample requires 20 ml of N/50 H_2SO_4 for phenolphthalein end point and another 20 ml for complete neutralization. Calculate type and amount of alkalinity present	6	CO3	BT3	1.2.2
	Q7	Define term hardness. How to determine hardness by EDTA method (Explain theory, procedure and general calculation)	10	CO3	BT2	5.1.1

366

	Q8	Explain Carbon di oxide phase diagram with suitable diagram and explain the areas, curves and points. Give the difference between water and carbon di oxide phase diagram (at least three)	9	CO3	BT3	5.1.1
	Q9	Explained the detailed green synthesis of: (i) Ibuprofen (ii) Sebasic Acid	8	CO3	BT4	5.1.1
PART-D	Q10	Write a note on the green initiatives taken in Indian industrial prospects with an example	6	CO4	BT1	1.1.1
	Q11	Discuss Green Engineering Principle with suitable examples: (i) Output pulled rather than input pulled (ii) Maximize efficiency	10	CO4	BT3	5.1.1
	Q12	What do you mean by Functional of system substitution? Explain by giving suitable example	6	CO4	BT4	1.1.1
	Q13	Write a note on: (i) Energy efficient computing (ii) Carbon free computing	10	CO4	BT2	1.2.1

********** END **********

367

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DEPARTMENT OF CHEMISTRY

"End Term Examination, Jan-2023"

SEMESTER	**I**	**DATE OF EXAM**	**21.01.2023**
SUBJECT NAME	**CHEMISTRY-I**	**SUBJECT CODE**	**CHH144T**
BRANCH	**ECE/[redacted]/CDA/CSTI/AIML/SMA/ECE-VLSI**	**SESSION**	**I**
TIME	**3 hrs**	**MAX. MARKS**	**100**
PROGRAM	**B.Tech**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Harsha Devnani, Dr. Jaya Tuteja, Dr. Arpit Sand and Dr. A. Jaymani**	**NAME OF COURSE COORDINATOR**	**Dr. A. Jayamani** Arpit Sand

Note: Part A: All questions are compulsory.
Part B & Part C: Attempt any two questions.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Differentiate polarization and polarizability?	5	CO1	BT2	
	1(B)	What are the three rules of the Aufbau principle and state its limitations?	5	CO3	BT1	
	1(C)	Explain disinfection process of water?	4	CO3	BT2, BT1	
	1(D)	What are the two theories of corrosion? Explain with suitable examples?	6	CO1	BT1, BT2	
PART-B	Q2(A)	Discuss conformation analysis of n butane and energy level diagram of for rotation in C_2-C_3?	10	CO	BT2, BT3	
	2(B)	With the help of suitable examples differentiate between enantiomers and diastereomers?	5	CO1	BT2, BT3	
	2 (C)	Discuss absolute confirmation and rule involved for confirmation?	5	CO4	BT3	
	Q3(A)	Discuss synthesis of Aspirin by conventional and green chemistry method?	5 + 5	CO5	BT3	
	3(B)	Explain Green Chemistry Principle # 1Waste Prevention and Green Chemistry Principle # 3 Less Hazardous Chemical Syntheses:	5 + 5	CO5	BT2	
	Q4(A)	Explain the below: (i) Linkage Isomers (ii) Coordination Isomers (iii) Ionization isomers	3*5	CO4	BT2, BT3	

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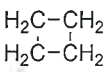
368

		(iv) Geometrical Isomers (v) Solvate isomers				
	4(B)	What are three purposes of green chemistry?	5	CO5	BT2	
PART-C	Q5(A)	State Beer's and Lambert's law, explant the terms involved in Lambert-Beer's law? Discuss the instrumentation of Electronic spectroscopy?	5+5	CO6	BT4	
	5(B)	Write a short note on electromagnetic spectrum and write the relationship between wavelength, frequency and wave number?	5+5	CO6	BT4	
	Q6(A)	What are the selection rules (I) Electronic Spectroscopy (II) Rotational and vibrational Spectroscopy	5+5	CO6	BT2	
	(B)	What is phosphorescence and fluorescence? How they are different from each other, Discuss with the help of jablonskii diagram?	10	CO6	BT3	
	Q7(A)	Define the term chemical shift in NMR spectroscopy and describe the factors which influence it?	10	CO6	BT4	
	(B)	What is the principle of NMR spectroscopy, write its application?	5	CO6	BT3	
	(C)	Predict the number of signals in the following compounds? $CH_3CH_2NH_2$ 	2.5 *2=5	CO6	BT4	
		********** END **********				

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DEPARTMENT OF CHEMISTRY
End term Examination January 2023

SEMESTER	**Ist**	**DATE OF EXAM**	**13-01-2023**
SUBJECT NAME	**Environmental Sciences**	**SUBJECT CODE**	**CHH137**
BRANCH	**B.Tech CSE**	**SESSION**	**I**
TIME	**09:00 AM to 11:00 AM**	**MAX. MARKS**	**50**
PROGRAM	**B.Tech CSE**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. V. V. Pathak**	**NAME OF COURSE COORDINATOR**	**Dr Meena Kapahi** Arpit Sand

Note: All questions are compulsory. Marks are indicated against each question.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(A)	**Removal of top soil is also termed as:** (i) Soil degradation (ii) Soil erosion (iii) Soil formation (iv) Precipitation	1	CO1	L2	
	Q1(B)	**Which of the following sector contribute maximum share in total renewable energy generation?** (i) Solar energy (ii) Wind Energy (iii) Biomass Energy (iv) Tidal energy	1	CO1	L2	
	Q1(C)	**The ozone-oxygen cycle in stratosphere is also termed as:** (i) Gaseous cycle (ii)Chapman cycle (iii) Sedimentary cycle (iv) Oxygen cycle	1	CO1	L1	
	Q1(D)	**Acid rain is composed of:** (i) Water vapor + CO_2 + NO_2 (ii) SO_2 + NO_2 + Water vapor (iii) Hydrocarbon + Water vapor (iv) All of the above	1	CO1	L2	
	Q1(E)	Who is called the father of green revolution in India? (i) Norman Borlaug (ii) Rachel Carson (iii) KR Narayanam (iv) M.S. Swaminathan	1	CO1	L1	

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	Q1(F)	**The place where an living organism is provided with suitable life sustaining condition is known as:** (i) Habitat (ii) Ecosystem (iii) Niche (iv) Environment	1	CO2	L1	
	Q1(G)	**Which of the following belongs to the edaphic factors of ecosystem?** (i)Soil & Minerals (ii) Rainfall (iii) Temperature (iv) All of the above	1	CO2	L1	
	Q1(H)	**Landform features found on the earth surface is termed as:** (i) Lithosphere (ii) Landscape (iii) Hydrosphere (iv) None of the above	1	CO2	L1	
	Q1(I)	**Which of the following statement is true with respect to desert ecosystem?** (i)It is the place with moderate rainfall (ii) It is the driest and hottest place on the earth. (iii) Soil type is uniform throughout the desert ecosystem. (iv) Broad leaf trees are the main features of desert ecosystem.	1	CO2	L2	
	Q1(J)	**Detritus food chain begins with:** (i) Dead organic matter (ii) Green Plants (iii) Secondary consumers (iv) Tertiary consumer	1	CO2	L2	
PART-B	Q2	**Match the items of column A with those of column B:** column A / column B (a) Carbon dioxide / (i) Reduced oxygen supply in blood (b) Chlorofluorocarbon / (ii) Green house gas (c) Carbon monoxide / (iii) Damage ozone layer (d) Sulphur dioxide / (iv) Acid rain	2	CO3	L2	
	Q3	**Fill correct/appropriate term:** (i) ..... are the large open area used to dispose splid waste. (ii) Domestic waste is commonly called as..... (iii) .....is the process of burning of hazardous waste under controlled air supply.	3	CO4	L3	
	Q4	What is water pollution? Explain the source, impact and control methods for water pollution.	5	CO2	L2	

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	Q5	What do you understand by endemic, invasive and exotic species? Explain in-situ and ex-situ biodiversity conservation methods.	5	CO3	L1	
	Q6	Define 'Hazard' and Natural disaster'. Explain disaster preparedness for earthquake.	5	CO4	L2	
PART-C	Q7	Mention whether the given statement is true or false: (a) Group of individual of same species is termed as population. (b) Maximum reproduction capacity of an organism under optimum condition is known as fertility. (c) COVID 19 disease is mainly spread by contaminated water. (d) Water vapor is the earth's most abundant green house gas.	4	CO3	L2, L3	
	Q8	Write Short notes on following: (i) Rainwater Harvesting (ii) Infectious disease (iii) Population pyramid	6	CO3	L3	
	Q9	What do you understand by population explosion? Explain the adverse impacts of population growth.	5	CO4, CO5	L3, L4	
	Q10	How sustainable development is useful in environmental conservation?	5	CO4	L3	

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DEPARTMENT OF CHEMISTRY

"T3 Examination, Dec-2022"

SEMESTER	**III**	**DATE OF EXAM**	**12.12.2022**
SUBJECT NAME	**Organic Chemistry-I**	**SUBJECT CODE**	**CHH237-T**
BRANCH	**Education**	**SESSION**	**I**
TIME	**9:00 to 12:00**	**MAX. MARKS**	**80**
PROGRAM	**BSc BEd**	**CREDITS**	**3**
NAME OF FACULTY	**Dr. Shilpa Sharma**	**NAME OF COURSE COORDINATOR**	**Dr. Shilpa Sharma**

Note: All questions are compulsory.

Arpit Sand

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A)	The specific rotation of pure (R)-2-butanol is -13.5°. What % of a mixture of the two enantiomeric forms is (S)-2-butanol if the specific rotation of this mixture is -5.4°?	4	CO1	BT3
	1(B)	Write the confirmation of n-butane and discuss their relative stability	6	CO1	BT2
PART-B	Q2(A)	Explain the following (i) Photochemical [2+2] cycloaddition reaction (ii) Diels-Alder reaction [4+2] cycloaddition	3	CO2	BT2
	2(B)	As the number of carbons in cycloalkanes increases the stability increases but the reactivity decreases. Justify with an example	2	CO2	BT2
	Q3(A)	Discuss the Position and Chain Isomerism	2	CO1	BT1
	3(B)	Explain the Markownikov's Rule	3	CO2	BT2

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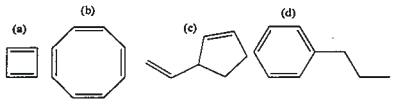
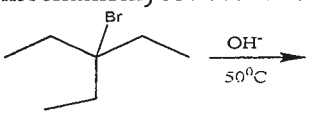
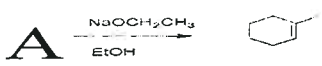
PART-C	Q4(A)	Define Huckel Rule. Classify the following into aromatic and non-aromatic on the basis of huckle rule 	8	CO3	BT3
	Q5(A)	Explain that electron withdrawing groups on benzene direct the incoming electrophile to meta position. Why Chlorine behaves differently.	5	CO3	BT1
	5(B)	Briefly explain the Energy Profile diagram for aromatic electrophilic substitution (both sigma and pie bond)	6	CO3	BT2
	Q6(A)	What are activating groups. How does activating group affects the reactivity	5	CO3	BT2
	6(B)	Why certain groups are preferentially ortho-para directing while others are mainly meta directing.	6	CO3	BT2
PART-D	Q7(A)	How do the product differ when ethyl bromide reacts separately with aqueous KOH and alc. KOH. Illustrate your answer with proper reasoning	6	CO4	BT2
	7(B)	Answer the following questions: (i) What is the general rate equation (ii) What happens to the rate of the reaction if the concentration of nucleophile is increased by a factor of 3? (iii) What happens to the rate of the reaction if the concentration of both nucleophile and electrophile are increased by a factor of 3 (iv) If it is desired to increase the rate of a reaction by a factor of 8, but the concentration of nucleophile can only be increased by a factor of 2, what would the concentration of electrophile need to be?	8	CO4	BT3
	Q8(A)	Show the major organic Product (with mechanism) for the following reactions:  or Write the reactant molecule required for the following reaction to complete (Also, Name the mechanism involved) 	5	CO4	BT2
	8(B)	Which of the following alkyl halides would you expect to undergo SN1 reaction most rapidly. and Why?	3	CO4	BT3

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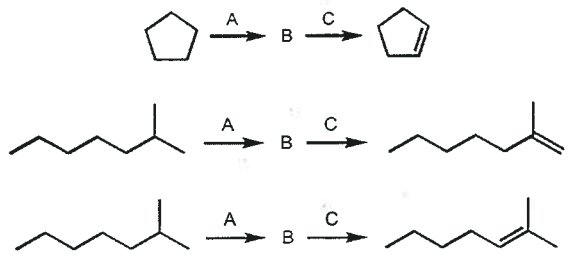
	$CH_3CH_2CH_2CH_2CH_2$-Br (A) $CH_3CH_2CH_2CH(CH_3)$-Br (B) $CH_3CH_2C(CH_3)_2$-Br (C)			
Q9(A)	Give the missing reagents and structures: 	8	CO4	BT4

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DEPARTMENT OF CHEMISTRY

END TERM Examination, DEC-2022

SEMESTER	III[RD]	DATE OF EXAM	15.12.2022
SUBJECT NAME	Environmental Sciences	SUBJECT CODE	CHH137
BRANCH	BA/HCM/OM/EFB/FAA	SESSION	I
TIME	09:00 AM-11:00 AM	MAX. MARKS	50
PROGRAM	BBA	CREDITS	4
NAME OF FACULTY	Dr V.V. Pathak	NAME OF COURSE COORDINATOR	Dr. V.V.PATHAK Approved

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	**Which of the following is the coldest region of earth's atmosphere?** (i) Stratosphere (ii) Mesosphere (iii) Ionosphere (iv) Troposphere	1	CO1	L1	
	1(B)	**Flowing water bodies are also referred as:** (i) Lentic ecosystem (ii) Lotic ecosystem (iii) Pond ecosystem (iv) None of the above	1	CO1	L1	
	1(C)	**A watershed is also called as:** (i)Drainage basin (ii) Catchment area (iii) Independent drainage unit (iv) All of the above	1	CO1	L1	
	1(D)	**Forest cover in India is about:** (i) 21.7% (ii)33% (iii)40% (iv)20%	1	CO1	L1	
	1(E)	**Which of the folloing is an example of biotic resource:** (i) Coal (ii)Crude oil (iii)Natural Gas (iv)All of the above	1	CO1	L1	
	1(F)	**Which of the following is an example of renewable energy?** (i) Wind energy (ii) Tidal energy (iii) Solar Energy (iv) All of the above	1	CO2	L1	

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	1(G)	**Soil erosion that forms small channel is termed as:** (i) Rill erosion (ii) Wind erosion (iii) Gully erosion (iv) Ephemeral erosion	1	CO2	L1	
	1(H)	**Crop rotation is useful for prevention of:** (i)wasteland degradation (ii) soil erosion (iii)climate change (iv) Air pollution	1	CO2	L1	
	1(I)	**Which of the following is an example of secondary air pollutant?** (i)Ozone (ii)Carbon dioxide (iii) Nitrogen dioxide (iv)Sulphur dioxide	1	CO2	L1	
	1(J)	**Which of the following method is used for disposal of hazardous waste?** (i)Vermi-composting (ii)Anaerobic digestion (iii)Incineration (iv)Recycling	1	CO3	L1	
PART-B	Q2.	Differentiate between the followings with examples : (a) Genetic and Species diversity (b) Primary and secondary ecological succession	5	CO4	L1	
	Q.3.	Define the term 'ecosystem'. Explain the biotic and abiotic component of ecosystem with examples.	5	CO3, CO4	L2, L3	
	Q.4.	Explain the cause, impacts and control measures for water pollution.	10	CO3	L3	
PART-C	Q.5	What is solid waste management? Explain the three 'R' of solid waste management.	5	CO5	L3	
	Q.6	What do you understand by remote sensing? Explain the application of remote sensing in environmental management.	10	CO5	L3	
	Q.7.	What do you understand by global warming? What are sustainable solutions for global warming?	5	CO5	L3	

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DEPARTMENT OF CHEMISTRY

"T3 Examination, Dec-2022"

SEMESTER	**3rd**	**DATE OF EXAM**	**17.12.2022**
SUBJECT NAME	Photochemistry & Pericyclic Reaction	**SUBJECT CODE**	CHH614-B
BRANCH	Chemistry	**SESSION**	**Morning**
TIME	**3 hrs**	**MAX. MARKS**	**100**
PROGRAM	**MSc**	**CREDITS**	**4**
NAME OF FACULTY	**Sangita Banga**	**NAME OF COURSE COORDINATOR**	**Sangita Banga** Arpit Sand

***Note**:Part A: Each question is of 10 marks, attempt any two of three.*

Part B: Each question will be of 20 marks and attempt any four from Part B.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Cyclobutanone on α Cleavage undergo ring expansion with retention on stereochemistry. Explain the condition for the retention of stereochemistry with the support of example.	2	CO2	BT3	2.1.1
	1(B)	Trans isomer are geometrically more stable then why the ratio of Cis-isomer would always be higher than Trans in mixture on irradiation	2	CO2	BT2	2.1.1
	1(C)	Give reason for your answer with suitable example, wherever applicable (i) α Cleavage of cyclobutanone is 10 times more efficient as compared to cyclopentanone. (ii) Photoenolization is favored by ortho not para substituted aryl ketones	3	CO2	BT1	5.1.1
	1(D)	Discuss the mechanism of 1, 2 alkyl shift in substituted aromatics by Prismane Intermediate.	3	CO2	BT2	5.1.1
	2(A)	Explain the mechanism of dimerization of 1,3-butadiene in solution in the presence of acetophenone and benzil sensitiser	2.5	CO2	BT2	2.1.1
	2(B)	What is meant by conrotatory & disrotatory movement? Explain with example.	2.5	CO2	BT2	5.1.1
	2(C)	How pericyclic reaction differs from normal reaction. Give some important characteristics of	2.5	CO4	BT1	1.1.1

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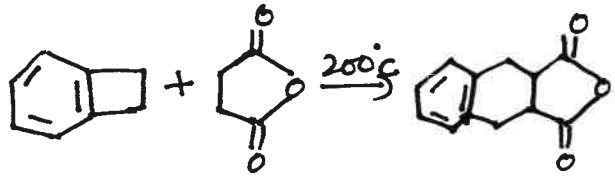
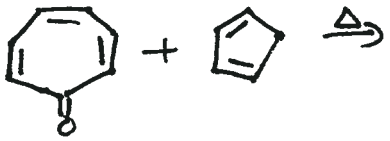
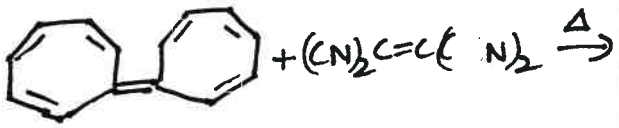
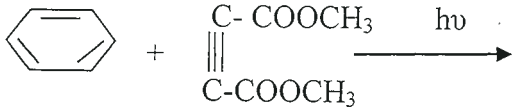
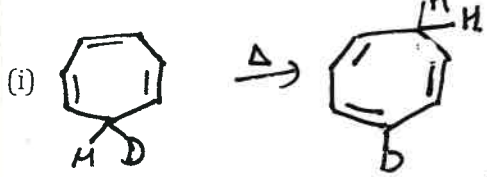
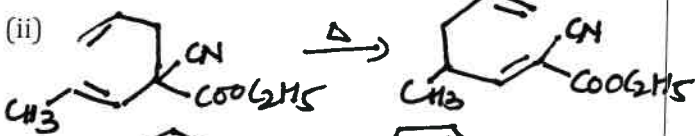
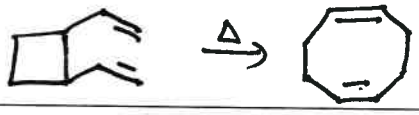
		pericyclic reaction.				
	2(D)	Explain why NO_2 is meta directing for photo induced aromatic nucleophilic substitution reaction.	2.5	CO2	BT2	2.1.1
	3(A)	Suggest mechanism for the reaction given below 	2.5	CO2	BT3	1.1.1
	3(B)	Complete the reactions: (i)  (ii)  (iii) 	2.5X3	CO3, CO4	BT3	9.1.2, 11.2.1
PART-B	Q4(A)	[1,5] Sigmatropic shift of hydrogen is thermally allowed but photochemically forbidden. Explain why?	5	CO4	BT3	5.1.1
	4(B)	Write a note on the following: (i) Cope rearrangement (ii) Claisen rearrangement	5	CO4	BT3	2.2.1
	4 (C)	From the given product explain the detailed mechanism through which the reaction is carried out and mention the sigmatropic shift : (i)  (ii)  (iii) 	5X2	CO4	BT4	9.1.2, 10.3.1

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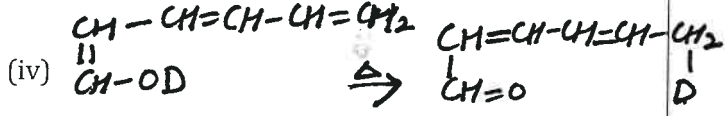
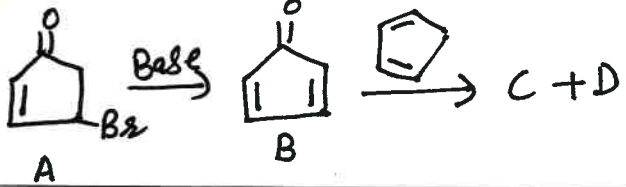
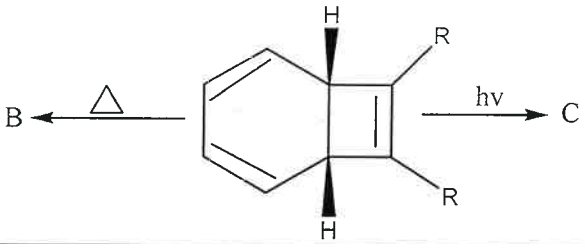
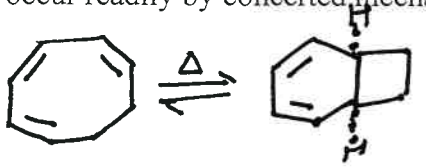
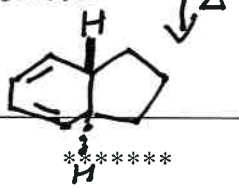
	(iv)  (v) 				
Q5(A)	With the help of FMO show that [2+2} cycloaddition reaction is photochemically allowed and thermally forbidden.	5	CO4	BT3	2.2.1
5(B)	Give the mechanism of Cheleotropic reaction between alkene and carbine. Discuss the stereospecificity of the product.	5	CO4	BT3	2.2.1, 10.3.1
5(C)	Predict whether the [4+2] cycloaddition could be photoinduced if the dienophile, instead of diene were the excited reactants. Explain your answer.	5	CO2, CO4	BT4	2.2.1, 11.2.1
5(D)	The reaction of compound (A) with base gives molecule (B) which undergoes [2+2] cycloaddition reaction with cyclopentadiene to give two different products. Identify the products formed in the reaction with the help of proper movement of bonds and arrows. 	5	CO2, CO4	BT5	2.2.1, 10.3.1
Q6(A)	Complete the reaction given below& give proper explanation for your answer. 	5	CO2, CO4	BT4	2.2.1, 10.3.1
6(B)	Which of the following electrocyclic reaction should occur readily by concerted mechanism: (i)  (ii) 1,3,5-Cyclononatriene 	5	CO2, CO4	BT3	2.2.1

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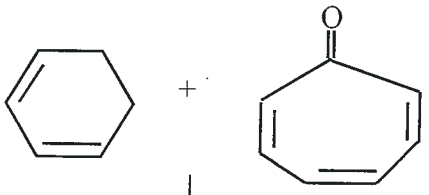
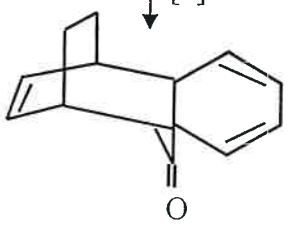
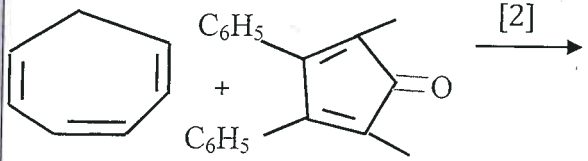
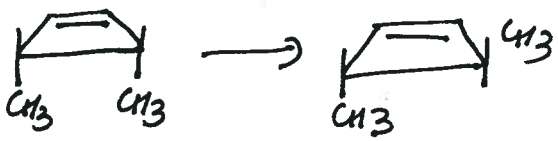
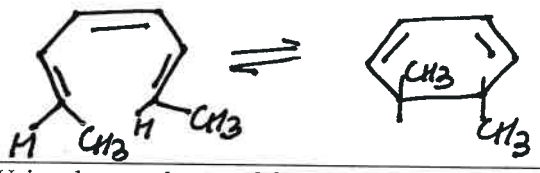
6(C)	What type of cycloaddition occurs in Reaction [1]? Draw the product of a similar process I Reaction [2]. Would you predict that these reactions occur under thermal or photochemical conditions?  [1]   [2]	5	CO2, CO4	BT4	2.2.1, 10.3.1
6(D)	How would you carry out conversion of cis 3,4-dimethyl cyclobutene to trans 3,4-dimethyl cyclobutene? Explain & give mechanism. 	5	CO2 &CO3	BT5	2.1.2
Q7(A)	Draw & explain the correlation diagram for the conrotatory & disrotatory interconversion of cyclobutene -butadiene system.	5	CO2, CO4	BT3	2.4.2
7(B)	With the help of FMO approach, explain whether the following reaction will be allowed thermally or photochemically. 	5	CO4	BT4	2.3.1
7(C)	Write the products of following electrocyclic reactions & write whether the reaction will proceed in conrotatory or disrotatory fashion. Also give the stereochemistry of the products. (i) 	2.5X4	CO4, CO3	BT4	2.3.1, 10.3.1

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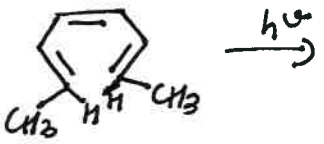
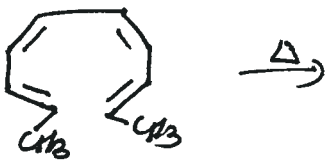
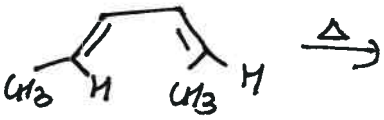
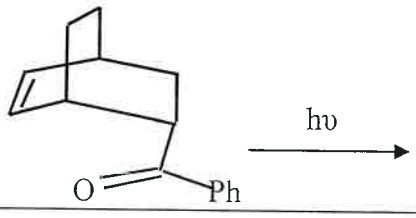
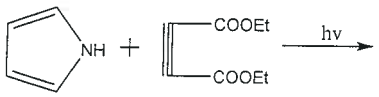
	(ii)  (iii)  (iv) 				
Q8(A)	In case of ring closure reaction of 1,3-butadiene, explain the selection rules by Huckle Mobius method & Woodward Hoffmann Rule.	5	CO4	BT3	2.4.2
8(B)	Complete the reaction given below and explain the mechanism for the formation of product. Also mention which name reaction it is known as. 	5	CO2	BT4	2.1.2
8(C)	Give reason for the formation of Endo product as main product with the help of suitable example.	2.5	CO2	BT2	2.1.1
8(D)	Reactivity of Diels Alder reaction increases by introduction of electron withdrawing substituent in dienophile. Give reason for your answer through an example.	2.5	CO2	BT2	2.1.1
8(E)	Predict the missing reactant/ product formed in the given reaction:  	2.5X2	CO3 & CO4	BT3	2.2.1, 10.3.1

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MANAV RACHNA Vidyaparisahal

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DEPARTMENT OF CHEMISTRY

End Term Examination, Dec-2022"

SEMESTER	**III**	**DATE OF EXAM**	**15.12.2022**
SUBJECT NAME	**Modern Organic Synthetic Techniques**	**SUBJECT CODE**	**CHH615B**
BRANCH	**Chemistry**	**SESSION**	**2022-2023 (I)**
TIME	**09:00 - 12:00**	**MAX. MARKS**	**100**
PROGRAM	**M.Sc Chemistry (organic)**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Jaya Tuteja**	**NAME OF COURSE COORDINATOR**	**Dr. Jaya Tuteja**

Note: All Questions are compulsory

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Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(a)	How biaryl product is synthesized?	3	CO1	BT4	1.3.2
	Q1(b)	State 2 coupling reaction with suitable examples?	4	CO2	BT2	1.3.2
	Q1(c)	Discuss the reduction of carbonyl with hydride transfer reagents?	3	CO1	BT3	1.3.2
PART-B	Q2(a)	Illustrate a method to oxidize C level 3 to C level 4?	3	CO3	BT2	1.3.2
	Q2(b)	Evaluate the 2 best methods for synthesizing selectively aldehyde from primary alcohols?	4	CO3	BT4	1.3.2
	Q2(c)	Write a note on wolf kishner reduction reaction?	3	CO3	BT4	1.3.2
PART-C	Q3(a)	What is the order of nucleophilicity of Enol Enolate and Enamine, and why?	3	CO4	BT3	1.3.2
	Q3(b)	Under which condition $KMnO_4$ is soluble in benzene?	3	CO5	BT2	1.3.2
	Q3(c)	How can you differentiate the kinetically stable and thermodynamically stable enols?	4	CO5	BT4	1.3.2
	Q4(a)	Draw the mechanism for the reaction of sulphur ylide with α, β-unsaturated aldehydes and ketones?	5	CO5	BT3	1.3.2
	Q4(b)	Can alkene be synthesized with high regioselectivity & stereoselectivity, if yes, How?	5	CO5	BT4	1.3.2
	Q5(a)	Discuss the stabilized and unstabilized P ylides with suitable example and propose the application of P ylides in organic synthesis?	5	CO5	BT3	1.3.2

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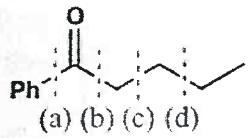
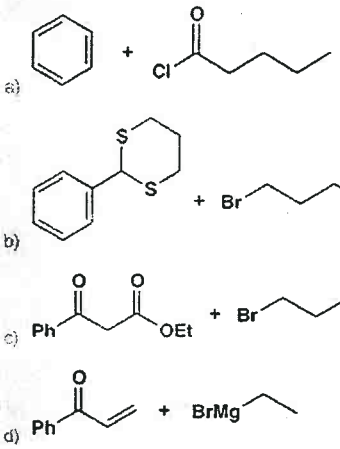
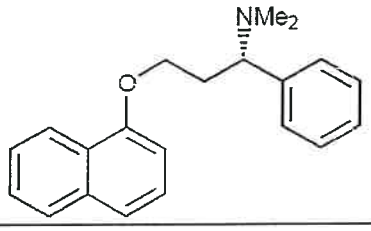
	Q5(b)	Illustrate the advantages of polymer supported reagents, their types and their properties?	5	CO5	BT2	1.3.2
	Q6(a)	What are the types of phase-transfer catalyst, Explain in detail?	5	CO5	BT3	1.3.2
	Q6(b)	Explain the Starks extraction and Makosza Interfacial mechanism for phase transfer catalysis?	5	CO5	BT4	1.3.2
PART-D	Q7(a)	Discuss the role of functional group interconversion (FGI) in reterosynthesis with suitable examples?	5	CO6	BT3	1.3.2
	Q7(b)	Examine 1,1- 1,2- C-X Disconnections in detail with suitable examples?	5	CO6	BT2	1.3.2
	Q8(a)	Discuss the importance of the orders of events in organic synthesis?	5	CO6	BT4	1.3.2
	Q8(b)	What is The "Retro" Diels-Alder Reaction, Explain with suitable example?	5	CO6	BT4	1.3.2
	Q9(a)	Which combination of reagents is wrong for disconnections (a)-(d) in the following?  (a) (b) (c) (d) 	4	CO6	BT2	1.3.2
	Q9(b)	Propose a retrosynthetic analysis of the following compound. Your answer should include both the synthons, showing your thinking, and the reagents that would be employed in the actual synthesis. 	8	CO6	BT5	1.3.2

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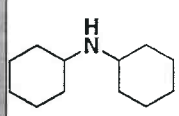
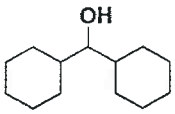
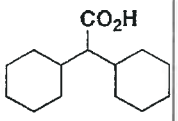
	Q10	How would you make these compounds?   	8	CO6	BT5	1.3.2

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DEPARTMENT OF CHEMISTRY

"End Semester Examination, Dec-2022"

SEMESTER	**III**	DATE OF EXAM	**12.12.2022**
SUBJECT NAME	**Symmetry and Group Theory**	SUBJECT CODE	**CHH601B**
BRANCH	**M.Sc Chemistry**	SESSION	**2022-2023 (I)**
TIME	**180 mins**	MAX. MARKS	**100**
PROGRAM	**M.Sc Chemistry III sem**	CREDITS	**4**
NAME OF FACULTY	**Dr. Roopa Rani**	NAME OF COURSE COORDINATOR	**Dr. Roopa Rani** Approved

***Note**: Attempt all questions*

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
	Part A				
Q1	Using the symmetry elements of C_{2v} point group, confirm that they follow the four mandatory conditions of a group.	4	CO1	3	
Q2	Determine the point group of the following molecules- a) CO_2 b) Staggered Ferrocene c) Trans H_2O_2	6	CO1	3,2	
Q3	Reduce the following representations into irreducible representations referring to the character table of C_{2v} point group E $2C_3$ $3C_2$ σ_h $2S_3$ $3\sigma_v$ a) 6 -2 2 2 -6 -2 b) 4 1 -2 -2 1 0	4	CO1	2	
Q4	Generate any two normalized wavefunction for the molecule of BF_3 through symmetry adapted linear combination. (Use the character table of D_{3h})	6	CO2	4	
	PART B				
Q5	Explain the orgel diagram for D and F term splitting with the configuration of d^2, d^8, d^3, d^7 tetrahedral and octahedral geometry.	5	CO3	5	

Character tables

Character table for C_{2v} point group

	E	C_2 (z)	σ_v(xz)	σ_v(yz)	linear, rotations	quadratic
A_1	1	1	1	1	z	x^2, y^2, z^2
A_2	1	1	-1	-1	R_z	xy
B_1	1	-1	1	-1	x, R_y	xz
B_2	1	-1	-1	1	y, R_x	yz

Character table for T_d point group

	E	$8C_3$	$3C_2$	$6S_4$	$6\sigma_d$	linear, rotations	quadratic
A_1	1	1	1	1	1		
A_2	1	1	1	-1	-1		
E	2	-1	2	0	0		(z^2 , x^2-y^2)
T_1	3	0	-1	1	-1	(R_x, R_y, R_z)	
T_2	3	0	-1	-1	1	(x, y, z)	(xy, xz, yz)

Character Table of D_{3h} point group

D_{3h}	E	$2C_3$	$3C_2$	σ_h	$2S_3$	$3\sigma_v$		
A_1'	1	1	1	1	1	1		x^2+y^2, z^2
A_2'	1	1	−1	1	1	−1	R_z	
E'	2	−1	0	2	−1	0	(x, y)	(x^2-y^2, xy)
A_1''	1	1	1	−1	−1	−1		
A_2''	1	1	−1	−1	−1	1	z	
E''	2	−1	0	−2	1	0	(R_x, R_y)	(xz, yz)

MANAV RACHNA
Vidyaparikshat

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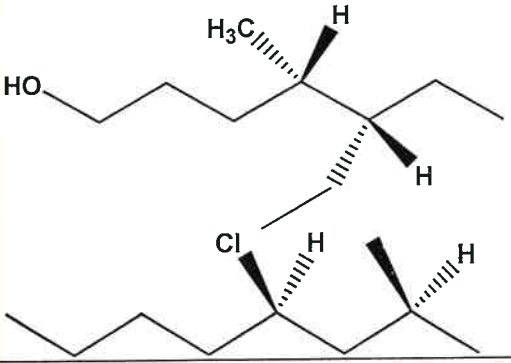
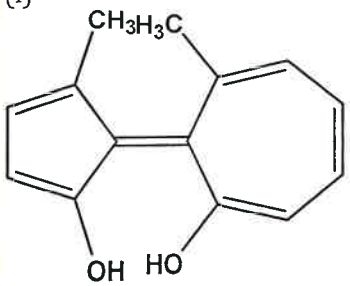
DEPARTMENT OF CHEMISTRY

"T3 Examination, December-2022"

SEMESTER	**III**	**DATE OF EXAM**	**9.12.2022**
SUBJECT NAME	**Organic Special-I: Statistical Stereochemistry & Asymmetric Synthesis**	**SUBJECT CODE**	**CHH 613B**
BRANCH	**CHEMISTRY**	**SESSION**	**I**
TIME	**9:00 a.m. to 12 noon**	**MAX. MARKS**	**100**
PROGRAM	**M.Sc. Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Ekta Rawat**	**NAME OF COURSE COORDINATOR**	**Dr. Ekta Rawat** Ekta Asoit Sond

Note: All questions are compulsory.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A)	Classify the absolute configuration of all chiral centers as R or S in the molecules below. 	2+2=4	CO1	BT3
	1(B)	Which of the following compounds will show geometrical isomerism: (i) 	4	CO1	BT3

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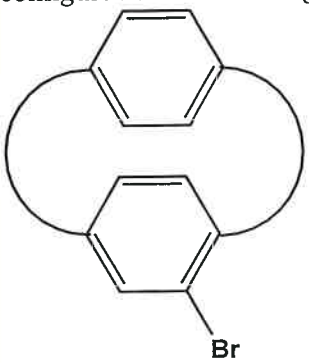
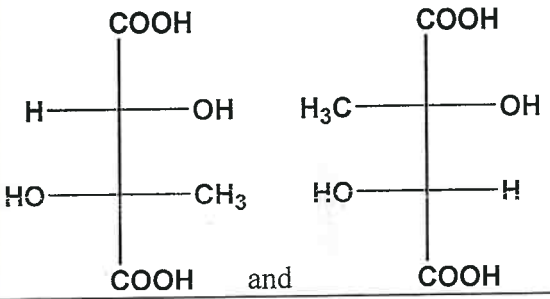
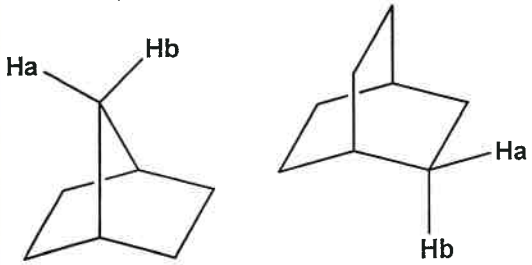
		(ii) NH=NH			
	1(C)	Write a short note on diastereomeric excess?	2	CO2	BT2
PART-B	Q2(A)	What are ANSA Compounds? Assign absolute configuration to following ANSA compounds: 	4	CO2	BT2,BT3
	2(B)	Find out the relation between the given pair of compounds: 	4	CO2	BT4
	2(C)	Name the relative member of amino acids and carbohydrates while assigning relative configuration?	2	CO2	BT2
PART-C	Q3(A)	Indicate if the hydrogens marked Ha and Hb are homotopic, enantiotopic or diastereotopic, in the following compounds: 	6	CO3	BT3, BT4

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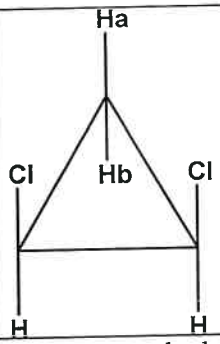
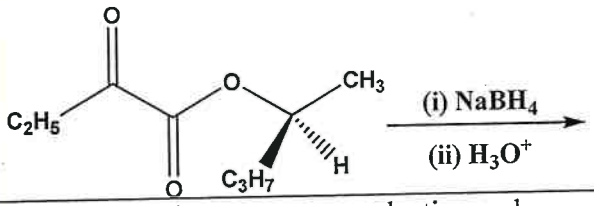
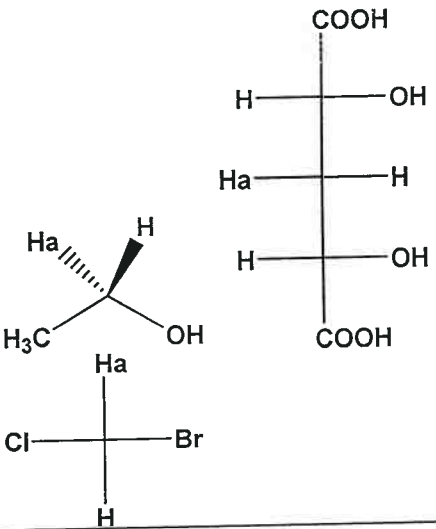
					
	3(B)	What controls the stereochemistry of this product? You are advised to draw a mechanism first and then assign the absolute configuration to the product. 	10	CO3	BT3, BT4
	3(C)	Differentiate between stereoselective and stereospecific reactions?	4	CO3	BT2
	4(A)	Assign prochirality w.r.t. to 'Ha' Pro R/Pro S to the following compounds: 	6	CO3	BT3, BT4
	4(B)	What do you mean by stereoselectivity of a reaction? Prelog's rule is used to introduce enantiontioselectivity in a reaction. Explain?	10	CO3	BT3, BT4
	4(C)	Depict the two faces of benzophenone as Re and Si.	4	CO3	BT3
PART-D	Q5(A)	How Ender's asymmetric α-alkylation of hydrazones of aldehydes and ketones helps in attaining the enantioselectivity in a reaction?	8	CO4	BT3, BT4
	5(B)	Why enzymes are considered as best tool for asymmetric synthesis? Give three examples.	6	CO4	BT3, BT4

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	5(C)	How is Jacobsen's precatalyst and catalyst synthesized using (R,R)-cyclohexane-1,2-diamine?	6	CO4	BT3, BT4
	Q6(A)	Discuss the role of bulky achiral auxillary in α-alkylation of amino acids via imidazolidinones.	8	CO4	BT3, BT4
	6(B)	Draw any three modified ligands used to synthesize chiral phosphine ligands in homogeneous catalysis.	6	CO4	BT3
	4(C)	Draw any three modified ligands used to synthesize chiral phosphine ligands in homogeneous catalysis.	6	CO4	BT3

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DEPARTMENT OF CHEMISTRY

"T3 Examination, December-2022"

SEMESTER	**III**	**DATE OF EXAM**	**15.12.2022**
SUBJECT NAME	**ORGANIC CHEMISTRY-II**	**SUBJECT CODE**	**CHH203B-T**
BRANCH	**Chemistry**	**SESSION**	**I**
TIME	**9:00 am-12:00noon**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc. Chemistry (Hons.)**	**CREDITS**	**4**
NAME OF FACULTY	**DR. EKTA RAWAT**	**NAME OF COURSE COORDINATOR**	**DR. EKTA RAWAT** 9/12 Amrit Sood

Note: All questions are compulsory.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A)	Discuss the mechanism of S_N1 reaction in alkyl halides with energy profile diagram.	6	CO1	BT2, BT3
	1(B)	Write any two methods of synthesis aryl halides.	4	CO1	BT2, BT3
	Q2(A)	Explain with examples Hydroboration-oxidation of alkenes. Write any two methods of synthesis aryl halides.	4	CO2	BT3
	2(B)	What is Claisen rearrangement? Give mechanism for *para*-rearrangement .	6	CO2	BT2, BT3, BT4
PART-B	Q.3(A)	Give briefly at least two methods of preparation of ketones.	3+3=6	CO3	BT2, BT3
	3(B)	Discuss following reaction with mechanism giving suitable examples: (i) Baeyer-Villiger oxidation (ii) Claisan-Schmidt Reaction	7+7=14	CO3	BT3, BT4
	Q4(A)	Write a short note on Rosenmund's reaction.	4	CO3	BT3, BT4
	4(B)	Why Cannizaro reaction is considered as self-oxidation or disproportionation reaction. Explain with mechanism.	8	CO3	BT3, BT4

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	4(C)	Aldehydes can be reduced to alcohols can be reduced to primary alcohols by reducing agents like $LiAlH_4$. Give detailed mechanism.	8	CO3	BT3
PART-C	Q5(A)	How can you justify the observed order of reactivity of acid derivatives towards nucleophilic substitution reactions?	7	CO4	BT3
	5(B)	What are acid amides? How can they be prepared from other acid derivatives?	7	CO4	BT3
	5(C)	Outline the mechanism of Dieckmann reaction.	6	CO4	BT3, BT4
	6(A)	How can you convert acid chloride into: (i)Carboxylic acids (ii) Amides	3+3=6	CO4	BT3, BT4
	6(B)	Write short note on following properties of esters: (i) Ammonolysis (ii) Alcoholysis	4+4=8	CO4	BT3
	6(C)	What is nucelophilic substitution? Give its mechanism.	6	CO4	BT2, BT3

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DEPARTMENT OF CHEMISTRY

"T3 Examination, Dec-2022"

SEMESTER	**3rd**	**DATE OF EXAM**	**12-12-2022**
SUBJECT NAME	**Physical chemistry-II**	**SUBJECT CODE**	**CHH201BT**
BRANCH	**Chemistry**	**SESSION**	**MORNING**
TIME	**9:00-12:00am**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc.(H)**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Priti Gupta**	**NAME OF COURSE COORDINATOR**	**Dr. Priti Gupta**

Approved

Note: ALL QUESTIONS ARE COMPULSORY. (Scientific calculator is allowed).

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM 'S LEVEL
PART-A	1(A)	Under what conditions the heat evolved or absorbed is equal to the internal energy change?	2	CO1	BT2
	1(B)	"The entropy of the system is constantly increasing ".Justify.	2	CO1	BT2
	1(C)	Derive "Gibb's Helmholtz "equation in terms of free energy and enthalpy change at constant pressure.	3	CO1	BT2
	1(D)	How Cp and Cv are related with each other? Derive the relationship.	3	CO1	BT3
	1(E)	Calculate the entropy change when 2 moles of an ideal gas are allowed to expand isothermally at 293 K from a pressure of 10 atmosphere to a pressure of 2 atmosphere.	3	CO2	BT4
	1(F)	Diffrentiate between Reversible and Irreversible process.	3	CO2	BT2
	1(G)	Write a short note on "Le Chatelier's Priciple".	4	CO2	BT2

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PART	Q2(A)	Describe the process of Reverse Osmosis with comparison to Osmosis. How Reverse process is used in Desalination of sea water.	7	CO3	BT4
	2(B)	A 5% aqueous solution by mass of a non-volatile solute boils at 100.15°C. Calculate the molar mass of the solute. K_b= 0.52 K kg mol^{-1}.	7	CO2	BT3
	2(C)	State Henry's law. Show that the volume of a gas dissolved in a given volume of solvent at constant temperature is independent of pressure.	7	CO3	BT2
	2(D)	Define the following terms: a) Ebullioscopic constant b) Raoult's Law	7	CO3	BT2
	2(E)	Calculate the vapor pressure of a solution made by dissolving 21.80 g of glucose (molar mass = 180.155 g/mol) in 460.0 g of H_2O at 30.0 °C. (The vapor pressure of the pure solvent is 31.82 mmHg at 30.0 °C.)	6	CO3	BT3
	2(F)	What do you understand by Cryoscopic constant? How molecular weight can be determined from depression of freezing point ?	6	CO3	BT2
PART-C	Q3(A)	With the help of two examples, show that the rate can be independent of initial concentration of the reactants. What is the order of such reactions?	8	CO3	BT2
	3(B)	50% of the first order reaction is completed in 23 minutes. Calculate the time required to complete 90% of the reaction.	5	CO4	BT3
	3(c)	Explain the term Effective collision .On what factors does it depends?	6	CO4	BT2
	3(D)	Explain Integrated rate equation and Graphical methods for determining the Order of reaction	6	CO4	BT3
	3(E)	Show that for a first order reaction, the time required for 99.9% completion of the reaction is 10 times that required for 50% completion.	7	CO4	BT4
	3(F)	Write short note on: 1)Activation Energy 2)Transition State theory 3)Pseudo order reactions	8	CO4	BT2

********** END **********

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DEPARTMENT OF CHEMISTRY

END TERM Examination, DEC-2022

SEMESTER	**Vth**	**DATE OF EXAM**	**17.12.2022**
SUBJECT NAME	**ENVIRONMENTAL ETHICS & SUSTAINABLE DEVELOPMENT/**	**SUBJECT CODE**	**CHS234**
BRANCH	**CSE/AIML/CSTI**	**SESSION**	**II**
TIME	**01:00 PM-2:30 AM**	**MAX. MARKS**	**50**
PROGRAM	**B.TECH**	**CREDITS**	**2**
NAME OF FACULTY	**Dr V.V. Pathak**	**NAME OF COURSE COORDINATOR**	**Dr. V.V.PATHAK** Arpit Saini

All questions are compulsory, marks are indicated against each questions.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Explain 'population explosion' and its impact on natural resources.	2	CO1	L2	
	1(B)	What do you understand by optimal use of resource consumption?	2	CO1	L2	
	1(C)	Explain current environmental issues related to over exploitation of natural resources.	2	CO1	L2	
	1(D)	Explain the concept 'egg of sustainability'.	2	CO2	L2	
	1(E)	Which of the following SDG is related to 'QUALITY EDUCATION'? (i) SDG 4 (ii)SDG 3 (iii) SDG 7 (iv)SDG 8	1	CO2	L1	
	1(F)	Which of the following is an example of bioenergy? (i)Biogas (ii)Biodiesel (iii)Bio-alcohol (iv)All of the above	1	CO2	L1	
PART-B	Q2.	What do you understand by 'Triple Bottle Line' in sustainable development?	5	CO1	L1	
	Q.3.	What is climate change? Explain the mitigation measures for climate change.	5	CO3	L2, L3	
	Q.4.	Explain the challenges in sustainable development in Indian scenario.	10	CO3	L3	
T-C	Q.5	What do you understand by sustainable tourism? How it is different from conventional tourism?	5	CO3	L3	

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	Q.6	Explain the role of information technology in sustainable development.	5	CO4	L3	
	Q.7.	Write short notes on: (i) Waste to wealth (ii) Agenda 21 (iii) Anaerobic digestion (iv) Biotic resources	10	CO4	L3	

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DEPARTMENT OF CHEMISTRY

End Term Examination, December-2022"

SEMESTER	V	DATE OF EXAM	12/12/2022
SUBJECT NAME	Biochemistry & Natural Products	SUBJECT CODE	CHH-302 BT
BRANCH	Chemistry	SESSION	I
TIME	9 AM - 12 NOON	MAX. MARKS	100
PROGRAM	B.Sc. (H) Chemistry	CREDITS	4
NAME OF FACULTY	Dr. Megha Bansal	NAME OF COURSE COORDINATOR	Dr. Megha Bansal

Note: All questions are compulsory.

Bloom's Level: L1-Remembering; L2-Understanding; L3-Applying; L4-Analyzing; L5-Evaluating; L6-Creating

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	The nucleotides in DNA and RNA have three components: a sugar group, a nitrogenous base, and a phosphate group. How one nucleotide is joined to the adjacent nucleotides. Discuss the type of bond present and its specific features.	5	CO1	L3	1.1.2
	1(B)	Compare and contrast structural and functional properties of (a) Purines and pyrimidines (b) Nucleoside and nucleotide	5	CO1	L3	1.1.1
	1(C)	What happens when (a) Alanine reacts with benzyl alcohol (b) BOC chloride reacts with glycine	5	CO2	L2	1.2.2
	1(D)	Discuss the significance of isoelectric point (PI) for amino acids. Calculate PI if pK1 = 2.34 and pK2 = 9.60	5	CO2	L3	4.1.2
PART-B	Q2(A)	Explain following observations with suitable chemical reactions: (a) D-fructose gives a positive Tollens's Test (b) $NaBH_4$ reduction of D-fructose gives two alditols, but the same reduction of D-glucose gives only one.	5	CO3	L3	5.2.1

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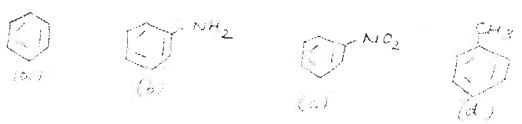
	2(B)	Elucidate cyclic structure of glucose by considering following points: (a) cyclic hemiacetal ring (b) Fischer structure (c) Haworth structure	5	CO3	L4	4.1.2
	2 (C)	Discuss Following with suitable Example (a) Enantiomers (b) Diastereomers (c) Constitutional isomers (d) Mutarotation (e) Epimers	10	CO3	L4	4.1.2
	Q 3(A)	Give reasons: (i) Starch is digested in the human digestive system but cellulose is not. (ii) Glucose can be obtained in pyranose and furanose both forms but fructose only one.	5	CO3	L4	4.1.2
	3(B)	Using Fischer projection formulas (a) Write an equation for the reaction of glucose with phenylhydrazine (b) Ene-diol rearrangement	5	CO3	L4	7.2.1
	3 (C)	What is glycosidic linkage. Discuss the structure of maltose and sucrose. Comment upon the reducing properties of both disaccharides.	10	CO3	L3	7.2.1
	Q 4(A)	"The presence of chromophore alone is not only responsible for the color of the molecule." Justify this statement with the help of a suitable example. How conjugation is responsible for wavelength shift in molecules, thereby for their colors.	5	CO4	L2	7.2.1
PART-C	4(B)	Arrange following molecules in the increasing order of λmax and explain the reason for the same. 	5	CO4	L3	5.2.1
	4 (C)	Dyes can be classified on the basis of method of application. Discuss the method which is best suitable for the dying of non-polar/synthetic fiber.	5	CO4	L3	5.2.1
	4 (D)	Discuss the importance of nitro and nitroso dyes by taking suitable example.	5	CO4	L3	5.2.1
	5(A)	Discuss the synthesis of Methyl orange. Elaborate on its uses in the dyeing industry and as an indicator.	5	CO4	L3	11.2.1
	5 (B)	How is Congo red prepared. Classify this dye on the basis of structure and application.	5	CO4	L4	11.2.1
	5 (C)	How are phenolphthalein and fluorescein prepared. What happens when excess alkali is added to phenolphthalein.	5	CO4	L4	11.2.1
	5 (D)	Discuss the commercial synthesis of Indigotin dye	5	CO4	L3	11.2.1
		********** END **********				

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400

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DEPARTMENT OF CHEMISTRY

"T3 Examination, DEC-2022"

SEMESTER	**VTH**	**DATE OF EXAM**	**14-12-2022**
SUBJECT NAME	**ANALYTICAL CHEMISTRY & SPECTROSCOPY**	**SUBJECT CODE**	**CHH303B T**
BRANCH	**Chemistry**	**SESSION**	I
TIME	**9:00-12:00am**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc.(H)**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Priti Gupta**	**NAME OF COURSE COORDINATOR**	**Dr. Priti Gupta** Gupta Arpit Sand

Note: All questions are compulsory.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A)	Describe the range of the electromagnetic radiations useful for Ultraviolet and Infrared spectroscopy.	2	CO1	BT2
	1(B)	Calculate the formula weight of $PdCl_2$ to correct number of significant figures.	2	CO1	BT2
	1(C)	Discuss two main roles of Analytical Chemistry in Pharmaceutical industries	2	CO1	BT2
	1(D)	Discuss the sources of indeterminate errors.	4	CO1	BT3
	1(E)	The electromagnetic radiation in the frequency range 10^{19} - 10^{17}Hz belongs to which region?	2	CO2	BT4
	1(F)	Which out of benzene (colorless) or Quinone (yellow) has more easily promoted electrons?	2	CO2	BT2
	1(G)	What structural features may produce bathochromic or hypochromic effect in an organic compound?	3	CO2	BT2
	1(H)	What do you understand by a good solvent in UV spectroscopy and what is the effect on absorption Maximum?	3	CO2	BT3
PART-B	Q2(A)	Discuss the principle of Thin –Layer Chromatography. In what way it is superior to paper chromatography?	6	CO3	BT2
	2(B)	Discuss the techniques used for the development of chromatograms.	7	CO3	BT1

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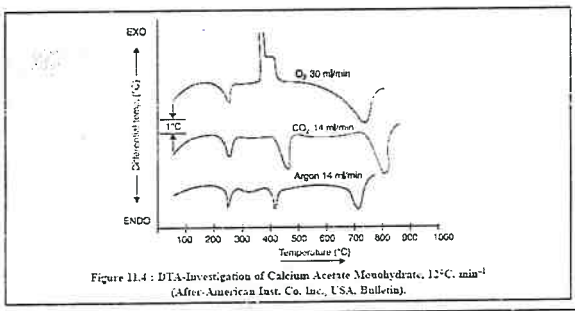
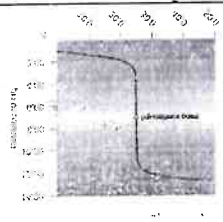
	2(c)	How column efficiency in chromatography is calculated? Why the efficiency of a chromatographic column does increases with an increasing number of theoretical plates?	7	CO3	BT4
	3(A)	Discuss Size exclusion chromatography with its principle, classification and applications.	7	CO3	BT2
	3(B)	With the help of schematic diagram of a HPLC unit describe the below components and their functions: 1) Column 2) Pumping system	8	CO3	BT2
	3(c)	What consideration should be taken into account for selecting a carrier gas in GSC?	5	CO3	BT2
PART-C	Q4(A)	Depicts the differential thermal analysis investigation of calcium acetate monohydrate at a uniform programmed heating rate of 12°C/minute.  Figure 11.4 : DTA-Investigation of Calcium Acetate Monohydrate, 12°C. min^{-1} (After-American Inst. Co. Inc., USA. Bulletin).	5	CO4	BT2
	4(B)	How equivalence point can be determined by various methods in Potentiometric titration and its advantages	7	CO4	BT3
	4©	Discss varios applicatios of DTA I fields of Aalytical, physical and Organic chemistry.	9	CO4	BT4
	4(D)	Define the term Thermogravimetry and classify it into various techniques.	6	CO4	BT2
	Q4(E)	 Discuss the type of above titration curve with proper explaination.	5	CO4	BT3
	4(F)	With the schematic diagram describe the various components and their function in DSC apparatus	8	CO4	BT3

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DEPARTMENT OF CHEMISTRY

"End Examination, Dec-2022"

SEMESTER	**V**	**DATE OF EXAM**	**16.12.2022**
SUBJECT NAME	**Physical Chemistry-IV**	**SUBJECT CODE**	**CHH301B-T**
BRANCH	**Chemistry**	**SESSION**	**2022-2023 (I)**
TIME	**09:00 am - 12:00 noon**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc Chemistry**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Harsha Devnani**	**NAME OF COURSE COORDINATOR**	**Dr. Harsha Devnani**

Note: All Questions are compulsory

Arpit Sand

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	Q1	Derive the Broglie relation and state its importance.	4	CO1	BT2
	Q2	Discuss Kronecker Delta.	4	CO1	BT1,BT2
	Q3	Comment on the simple harmonic oscillator vibrations for a diatomic molecule and five the expression relating force constant and frequency of vibration.	4	CO2	BT1,BT2
	Q4	Briefly explain Born-Oppenheimer approximation.	4	CO3	BT1
	Q5	Sketch the molecular orbital energy level diagram for CO molecule.	4	CO4	BT3
PART-B	Q6	Using the energy level expression and the appropriate selection rules draw an energy level diagram and the spectral transitions for the rotational Raman spectrum of a rigid diatomic rotor. Also show the appearance of the spectrum.	5	CO6	BT3
	Q7	Predict the high resolution pmr spectrum of 1,1,2-trichloroethane.	5	CO6	BT3
	Q8	Predict the number of ESR lines in the spectrum of (a) $CH_3CH_2\bullet$ radical (b) $CH_3CH_2CH_2\bullet$ radical	10	CO6	BT4
PART-C	Q9	Draw the Jablonski diagram and explain all the processes in detail.	6	CO6	BT1,BT2
	Q10	Discuss the rotational spectra of polyatomic molecules.	6	CO5	BT2

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403

	Q11	The pure rotational (microwave) spectrum of the gaseous molecule CN consists of a series of equally spaced lines separated by 3.7978 cm-1. Calculate the internuclear distance of the molecule. The molar masses are: ^{12}C = 12.011 and ^{14}N = 14.007 gmol^{-1}.	6	CO5	BT3
	Q12	a. Which of the following molecules give pure-rotational absorption spectra? N_2, O_2, NO, CH, CO, CO_2, N_2O, SO_2, C_2H_4, CH_4, and $H_2C=O$ (formaldehyde) b. Which of the following molecules give vibrational absorption spectra? N_2, O_2, NO, CH, CO, CO_2, N_2O, and SO_2.	6	CO5	BT4
	Q13	a. While there are pure rotational spectra, there is no such thing as pure vibrational spectra. Why? b. It is usually stressed that the vibrational spectroscopy yields valuable information about the "nature of bonding" in diatomic molecules. What quantity in this spectroscopy is particularly useful for this purpose?	6	CO5	BT4
PART-D	Q14	State and illustrate with suitable potential energy curves the Franck-Condon principle in the vibronic spectrum of a diatomic molecule.	6	CO6	BT2
	Q15	a. Comment on the intensities of Stokes and anti-Stokes lines in Raman spectrum. b. Comment on spin-spin coupling in 2-methyl propene and 1-chloro-2,2-dimethyl propane.	6	CO6	BT2,BT4
	Q16	Discuss the applications of ESR spectroscopy.	6	CO6	BT1,BT2
	Q17	Comment on the following: a. It is not usually possible to record IR spectra for aqueous solutions. b. Homonuclear molecules are IR inactive but Raman active	6	CO5	BT4
	Q18	Discuss why the charge transfer spectra have very high intensity.	6	CO6	BT2,BT4

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DEPARTMENT OF CHEMISTRY

END TERM Examination, DEC-2022

SEMESTER	**Vth**	**DATE OF EXAM**	**20.12.2022**
SUBJECT NAME	**Chemistry in Agriculture**	**SUBJECT CODE**	**CHS304B**
BRANCH	**BSC CHEMISTRY (Hons.)**	**SESSION**	**I**
TIME	**09:00 AM-10:30 AM**	**MAX. MARKS**	**50**
PROGRAM	**BSC CHEMISTRY (Hons.)**	**CREDITS**	**2**
NAME OF FACULTY	**Dr V.V. Pathak**	**NAME OF COURSE COORDINATOR**	**Dr. V.V.PATHAK** Arpit Sand

Note: *All questions are compulsory.*

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	**Silt is a:** (i) Fine grained soil with little or no plasticity. (ii) Clay with high mineral content. (iii) Volcanic lava (iv) Deposited material	1	CO1	L1	
	1(B)	**Soil transported by running water:** (i) Eolian soil (ii) Clay soil (iii) Alluvial soil (iv) None of the above	1	CO1	L1	
	1(C)	**In unified soil classification system OL stands for:** (i)Organic soil with low porosity (ii) organic soil with low plasticity (iii) Poorly graded organic soil (iv) Porous Silt	1	CO1	L1	
	1(D)	Explain the methods of soil sampling.	2	CO1	L1	
	1(E)	What is soil erosion? Explain methods to control soil erosion.	2	CO1	L1	
	1(F)	What do you understand by straight fertilizers?	2	CO2	L1	
	1(G)	Volume of soil which is either filled by water or air is termed as: (i)Bulk density (ii)Permeability (iii)Porosity (iv) None of the above	1	CO2	L1	
PART-B	Q2.	Explain the followings: (i) Soil erosion (ii) Fungicides	5	CO4	L1	

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405

	Q.3.	What is bio-fertilizer? Explain the method of preparation and advantages of bio-fertilizer.	10	CO3, CO4	L2, L3	
	Q.4.	Explain Bio-magnification, bio-accumulation and bio-transformation process with respect of heavy metal toxicity.	5	CO3	L3	
PART-C	Q.5	Explain the major and minor nutrients required for the plant growth.	5	CO3	L3	
	Q.6	Define the term 'plant growth promoters'. Explain the method for preparation of Indole Acetic Acid and Gibberlin.	10	CO4	L3	
	Q.7.	Explain sustainable agriculture practice with example.	5	CO4	L3	

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406

MANAV RACHNA Vidyaparishad

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Declared as State Private University vide Haryana Act 26 of 2014

DEPARTMENT OF CHEMISTRY

"End-term Examination, December-2022"

SEMESTER	V	DATE OF EXAM	19.12.2022
SUBJECT NAME	Transition Elements Coordination compounds and Chemical Kinetics	SUBJECT CODE	CHH312T
BRANCH	Education	SESSION	I
TIME	9:00 AM to 12:00 Noon	MAX. MARKS	80
PROGRAM	BSc BEd	CREDITS	3
NAME OF FACULTY	Dr. A. Jayamani	NAME OF COURSE COORDINATOR	Dr. A. Jayamani Arpit Sam

***Note**: All questions are compulsory. Kindly allow scientific calculator.*

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(A)	In transition metal some metals are termed as soft metals?	2	CO1	BT2	
	1(B)	How metal oxides of transition metals are classified?	2	CO1	BT2	
	1(C)	Give examples for lanthanide contraction?	2	CO1	BT3	
	1(D)	Which metal with very high melting point is extracted majorly by powder metallurgy?	2	CO1	BT1	
	1(E)	What are the different separation techniques involved for separating inner transition elements.	2	CO1	BT2	
PART-B	Q2(A)	What is the primary and secondary valency in $[Co(en)_3]$?	2	CO2	BT3	
	2(B)	Identify the ligands, coordination number and oxidation states of $K_2[FeCl_2(en)_2]$	2	CO2	BT3	
	2(C)	How chelated complexes gets extra stability?	2	CO2	BT2	
	2(D)	Optical isomerism will not be shown by complexes in which geometry?	2	CO2	BT2	
	2(E)	Explore the magnetic property of $[Cr(NH_3)_6]^{3+}$?	2	CO2	BT1	

PART- C	3(A)	What is rate and order of a reaction? How they can be obtained for a reaction explain with examples?	6	CO3	BT2	
	3(B)	Explain how a radioactive decay is considered as a first order reaction?	4	CO3	BT3	
	4(A)	What are the different methods used for determining the order of a reaction? Explain any two methods in detail.	6	CO3	BT2	
	4(C)	The rate constants of a reaction which occurred at 500K and 700 K are 0.02 S^{-1} and 0.07 S^{-1}, respectively. Calculate the value of activation energy of the reaction (log3.5 = 0.544).	4	CO3	BT4	
	5(A)	Write short notes on the transition state theory and collision theory	6	CO3	BT3	
	5(B)	What is activation energy? How does it interfere in rate of a reaction	4	CO3	BT2	
PART- D	6(A)	What is adsorption? Explain different types of adsorption process.	4	CO4	BT1	
	6(B)	How does the catalysts are classified? Explain each in brief	6	CO4	BT2	
	7(A)	Explain Langmuir adsorption isotherm highlighting how the equilibrium exists between adsorbate and adsorbent system.	6	CO4	BT2	
	7(B)	Explain the relation between Gibbs adsorption isotherm and surface excess.	4	CO4	BT1	
	8(A)	Describe in detail about BET adsorption isotherm for multilayer adsorption process and Illustrate different types of BET adsorption isotherms.	10	CO4	BT3	

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