

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234**DEPARTMENT OF CHEMISTRY**

Course Code: 33CT31	Programme: M.Sc.,	CIA: I Test
Date: 26.07.2019	Major: CHEMISTRY	Semester: III
Time: 2Hrs	Year: II	Maximum: 50 Marks
Course Title:	ORGANIC CHEMISTRY – III	

SECTION – A**Answer ALL questions****(5 x 1 = 5)**

- Why is the oxygen-hydrogen absorption of CH_3OH such a broad band in the infrared? **(CO1)**
 - Rotational energy levels broaden the absorption
 - Hyperconjugation resonance broadens the absorption
 - Hyperconjugation resonance broadens the absorption
 - Hydrogen bonding broadens the absorption
- Which is the correct order of increasing wave number of the stretching vibrations of (1) C-H (alkane), (2) O-H (alcohol), (3) C=O (ketone), and (4) $\text{C}\equiv\text{C}$ (alkyne)? **(CO1)**
 - (4) < (3) < (2) < (1)
 - (3) < (4) < (2) < (1)
 - (3) < (4) < (1) < (2)
 - (4) < (3) < (1) < (2)
- Which of the following is a correct order of fragmentation in organic molecule? **(CO3)**
 - σ bonding > π bonding > lone pair
 - π bonding > lone pair > σ bonding.
 - lone pair > π bonding > σ bonding
 - π bonding > σ bonding > lone pair
- In ionization chamber vapors are bombarded with fast moving..... **(CO3)**
 - Protons
 - Electrons
 - Neutrons
 - Antineutron
- In 1,3-butadiene, the number of nodes present in ψ_4 between the nuclei is **(CO4)**
 - 0
 - 1
 - 2
 - 3

SECTION – B**Answer any FIVE questions****(5 x 2 = 10)**

- How will you differentiate inter and intra molecular hydrogen bonding by IR spectroscopy? **(CO1)**
- Aniline absorbs at 280 nm but in acidic solution the the absorbtion band is seen at 203 nm which is comparable to benzene. Why? **(CO1)**
- Distinguish between the propanal and propanone by IR spectroscopy. **(CO1)**
- What do you mean by molecular ion peak? **(CO3)**
- Define base peak. **(CO3)**
- Write any three characteristics of pericyclic reactions. **(CO4)**
- What is meant by Cyclo addition reactions and give examples. **(CO4)**

SECTION – C**Answer any THREE questions****(3 x 5 = 15)**

- Calculate the λ_{max} for the following molecules **(CO1)**
 - p-chloroacetophenone
 - 2,3-dimethylene bicycle[2,2,1] heptanes
- How will you identify the following using UV-Visible spectroscopy? **(CO1)**
 - Cis and trans isomer
 - Keto-enol tautomerism
- Write a note on the following: i) Metastable peak ii) Nitrogen rule **(CO3)**
- Explain the fragmentation pattern of aniline and phenol. **(CO3)**
- 1,3,5 hexatriene ring closure reactions are photochemically allowed or not. Justify your answers with FMO theory. **(CO4)**

SECTION – D**Answer any TWO questions****(2 x 10 = 20)**

- Illustrate how electronic effects, conjugation and ring strain influencing the vibrational frequencies. **(CO1)**
- Discuss the fragmentation pattern of the following molecules in mass spectra. **(CO3)**
 - Ethyl bromide
 - Toluene
 - Cyclohexanol
- Write a note on **(CO3)**
 - Retro Diels-Alder rearrangement
 - McLafferty rearrangement
 - Isotopic peak

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DEPARTMENT OF CHEMISTRY

Course Code: 33CT32	Programme: M.Sc.,	CIA: I Test
Date: 24.07.2019	Major: CHEMISTRY	Semester: III
Time: 2Hrs	Year: II	Maximum: 50 Marks
Course Title:	INORGANIC CHEMISTRY – III	

SECTION – A

Answer ALL questions

(5 x 1 = 5)

- A well known naturally occurring organometallic compound is (CO1)
(a) vitamin B₁₂ coenzyme (b) chlorophyll (c) cytochrome P-450 (d) myoglobin
- The correct order of the CO stretching vibrational frequency is (CO2)
(a) $[\text{Ti}(\text{CO})_6]^{2-} > [\text{V}(\text{CO})_6]^- > \text{CO} > [\text{Cr}(\text{CO})_6]$ (b) $[\text{Cr}(\text{CO})_6] > \text{CO} > [\text{V}(\text{CO})_6]^- > [\text{Ti}(\text{CO})_6]^{2-}$
(c) $\text{CO} > [\text{V}(\text{CO})_6]^- > [\text{Ti}(\text{CO})_6]^{2-} > [\text{Cr}(\text{CO})_6]$ (d) $\text{CO} > [\text{Cr}(\text{CO})_6] > [\text{V}(\text{CO})_6]^- > [\text{Ti}(\text{CO})_6]^{2-}$
- The oxidative addition and reductive elimination steps are favoured by (CO3)
(a) electron rich metal centres (b) electron deficient metal centres
(c) electron rich metal centres and electron deficient metal centres respectively
(d) electron deficient metal centres and electron rich metal centres respectively
- The following reaction: $\text{RhI}_3(\text{CO})_2\text{CH}_3]^- \longrightarrow [\text{RhI}_3(\text{solvent})(\text{COCH}_3)]^-$ is (CO3)
(a) oxidative addition (b) reductive elimination (c) migratory insertion (d) addition
- The structure of Wilkinson catalyst is (CO5)
(a) Tetrahedral (b) Square planar (c) Trigonal bipyramidal (d) All of the these

SECTION – B

Answer any FIVE questions

(5 x 2 = 10)

- Define 18 electron rule. (CO1)
- CO is π -acid ligand. Account this statement. (CO2)
- Explain is β -hydrogen elimination. (CO3)
- Explain the term 'Oxidative coupling' (CO3)
- How is $\text{Mn}_2(\text{CO})_{10}$ is converted into $(\text{CH}_3)\text{Mn}(\text{CO})_5$ (CO3)
- Give the IUPAC name and formula of the Wilkinson catalyst. (CO5)
- Define hydroformylation process. (CO5)

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

- Illustrate the term hapticity with examples? How does it differ from denticity? (CO1)
- Discuss factor which affecting magnitude of stretching frequency of carbonyl ligand. (CO2)
- Organize the salient features of reductive elimination. (CO3)
- Build the evidence in favour of migratory insertion (CO3)
- Illustrate Tolman catalytic Loops. (CO5)

SECTION – D

Answer any TWO questions

(2 x 10 = 20)

- (a) Calculate EAN for following organometallic compounds. (CO1)
(i) $(\eta^6\text{-C}_6\text{H}_6)_2\text{Cr}$ (ii) $[\text{HMn}(\text{CO})_5]$ (iii) $[(\text{CH}_3\text{CO})\text{Rh}(\text{CO})\text{I}_3]^-$ (iv) $(\text{Cp-}\eta^3)\text{Fe}(\text{CO})_3(\text{CH}_3)$
(b) Calculate M-M bond for following compounds.
(i) $\text{Ir}_4(\text{CO})_{12}$ (ii) $\text{Fe}_2(\text{CO})_9$ (iii) $\text{Ru}_3(\text{CO})_{12}$ (iv) $[\text{Re}_2\text{Cl}_8]^{2-}$
- Classify the metal carbonyls. Discuss the nature of bonding of metal carbonyls. (CO2)
- Explain in detail about salient feature and mechanism of oxidative addition reaction. (CO3)

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Course Code: 33CT33	Programme: M.Sc.,	CIA: I Test
Date: 25.07.2019	Major: CHEMISTRY	Semester: III
Time: 2Hrs	Year: II	Maximum: 50 Marks
Course Title:	PHYSICAL CHEMISTRY – III	

SECTION – A**Answer ALL questions****(5 x 1 = 5)**

- The total number of symmetry operations in BF_3 molecule is **(CO1)**
a) 3 b) 6 c) 9 d) 12
- A linear molecule has _____ operations **(CO1)**
a) 29 b) 4 c) infinite d) 24
- NMR spectroscopy is observed in **(CO3)**
a) visible b) microwave c) radiowave d) gamma rays
- The unit of coupling constant is **(CO3)**
a) Tesla b) Gauss c) ppm d) Hz
- The important buffer in the blood consists of **(CO5)**
a) HCl and Cl^- b) H_2CO_3 and HCO_3^- c) H_2CO_3 and Cl^- d) HCl and HCO_3^-

SECTION – B**Answer any FIVE questions****(5 x 2 = 10)**

- Define symmetry element and symmetry operation. **(CO1)**
- In the solid state phosphorus (V) chloride exists as an ionic solid composed of PtCl_4^+ cations and PtCl_6^- anions. But the vapour is molecular. What point group do the ionic species in the solid belong? **(CO1)**
- Draw the structures of three distinct isomers of $\text{C}_2\text{H}_2\text{Cl}_2$ and determine their point groups. Which of them is polar? **(CO1)**
- Define shielding **(CO3)**
- Write down the selection rule for a nuclei to be NMR active. **(CO3)**
- What is meant by buffer solution? How it is classified? **(CO5)**
- How do buffers work in the blood? **(CO5)**

SECTION – C**Answer any THREE questions****(3 x 5 = 15)**

- Construct the multiplication table for C_{2v} and C_{2h} . **(CO1)**
- State and explain Great Orthogonality theorem. **(CO1)**
- Write the characteristics of point group. **(CO1)**
- Derive Henderson's equation to calculate the pH of a buffer solution. **(CO5)**
- What do you mean by relaxation process? Write its two types. **(CO3)**

SECTION – D**Answer any TWO questions****(2 x 10 = 20)**

- List out the molecules of symmetry element in the point group **(CO1)**
(i) Cyclohexane (chair and boat form) (ii) NF_3 (iii) Benzene (iv) Allene (v) $[\text{PtCl}_4]$
(vi) XeF_6 (vii) Diborane (viii) Norborane (ix) ethylene (x) Ferrocene
- Construct the character table for C_{2v} . **(CO1)**
- Define Chemical shift. What are the factors affecting it? **(CO3)**

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Course Code: 33NE3A	Programme: M.Sc., / M.COM	CIA: I Test
Date: 27.07.2019	Major: ZOOLOGY / M.COM	Semester: III
Time: 2Hrs	Year: II	Maximum: 50 Marks
Course Title:	FORENSIC CHEMISTRY	

SECTION – A**Answer ALL questions****(5 x 1 = 5)**

- The expansion of CBI is:
(a) Crime Board of India
(b) Central Bureau of India
(c) Crime Board of Investigation
(d) Central Bureau of Investigation
(CO1)
- The meaning of Narco in Greek language is
(a) Active
(b) Drug
(c) Anesthesia
(d) Therapy
(CO2)
- The prescribed level of narco analysis drug is
(a) 3g/1000 mL
(b) 3g/2000 mL
(c) 3g/3000 mL
(d) 3g/4000 mL
(CO2)
- Forensic serology involves _____ of bodily fluids:
(a) Detection
(b) classification
(c) analysis
(d) all the above
(CO4)
- Surface tension causes the blood drop to pull itself
(a) Horizontally
(b) vertically
(c) both a and b
(d) neither a nor b
(CO4)

SECTION – B**Answer any FIVE questions****(2 x 5 = 10)**

- What does forensic pathology represent?
(CO1)
- What is meant by Narco analysis?
(CO2)
- Mention the name of the drugs using in Narco Test.
(CO2)
- Define the term Polygraph.
(CO2)
- Write the types of pattern.
(CO4)
- Define the term expert.
(CO4)
- What is forensic serology?
(CO4)

SECTION – C**Answer any THREE questions****(3 x 5 = 15)**

- Give a gist of forensic anthropology.
(CO1)
- Briefly explain the dosage of drugs and authorities in Narco Analysis.
(CO2)
- Explain the Pre-test Interview in Polygraph analysis.
(CO2)
- What kind of results can be expected from blood pattern analysis?
(CO4)
- Write down all the activities undertaken in serology division.
(CO4)

SECTION – D**Answer any TWO questions****(2 x 10= 20)**

- What are the facilities available in the serology and physics division of central forensic science laboratory of India for analysis of crime?
(CO1)
- Sketch out the Precautions and Guidelines which are mainly involving in Narco Analysis
(CO2)
- Explain in detail about blood types and paternity determination.
(CO4)
