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Paper Code: M.Sc.-Chem-102 C (SVSU:2023-24/R)

Enrollment No.

Program Name: M.Sc. Chemistry

I Semester / Ist Year Examination

Subject Code: MSc-Chem-102

Subject Name: ORGANIC CHEMISTRY I

[Time : 03:00 Hours]

[Max. Marks : 70]

Note : 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs) [01×15=15]
 - I The presence of leaving group is must in
 - (a) addition reactions
 - (b) rearrangement reactions
 - (c) substitution reactions
 - (d) pericyclic reactions
 - II Which of the following is not an electrophile?
 - (a) BF₃
 - (b) AlCl₃
 - (c) NH₄⁺
 - (d) NH₃
 - III The reagent used in Birch reduction
 - (a) Conc H₂SO₄
 - (b) Na/Liq NH₃
 - (c) Quinone
 - (d) Dil. HCl
 - IV The number of pi electrons present in phenanthrene
 - (a) 10
 - (b) 12
 - (c) 14
 - (d) 16
 - V The least stable carbocation is
 - (a) primary
 - (b) secondary
 - (c) tertiary
 - (d) methyl
 - VI Enantiomers have all the properties identical except their
 - (a) boiling points
 - (b) melting points
 - (c) action on plane polarized light
 - (d) none
 - VII The reactions takes place in the presence of heat/light
 - (a) addition reactions
 - (b) condensation reactions
 - (c) rearrangement reactions
 - (d) pericyclic reactions
 - VIII Due to delocalization the acidity of a molecule
 - (a) increases
 - (b) decreases
 - (c) remain same
 - (d) all of the above
 - IX In which type of elimination reactions there is a formation of three membered ring?
 - (a) α- elimination
 - (b) β- elimination
 - (c) γ- elimination
 - (d) none
 - X The homolytic fission generates
 - (a) carbenes
 - (b) ions
 - (c) free radicals
 - (d) nitrenes
 - XI The SN² involves ----- steps reaction.
 - (a) one
 - (b) two
 - (c) three
 - (d) four
 - XII Which of the following molecule is aromatic in nature?
 - (a) cyclobutadiene
 - (b) cyclohexene
 - (c) cyclooctatetraene
 - (d) naphthalene

- XIII** Fullerene molecule contains
(a) 12 pentagon and 20 hexagon (b) 20 pentagon and 12 hexagon
(c) 15 pentagon and 20 hexagon (d) 12 pentagon and 24 hexagon
- XIV** Cope rearrangement is an example of
(a) addition reaction (b) rearrangement reaction
(c) condensation reaction (d) substitution reaction
- XV** Decomposition of diazomethane generates
(a) nitrene (b) benzyne (c) carbene (d) radical
- 2. Answer in long (any three) [10×3=30]**
- I** Explain Hammond 's postulates along with suitable potential energy diagram.
- II** What is perturbed molecular approach (PMO)? What are its characteristics?
- III** Discuss the stereochemistry of allene and biphenyl derivatives. Give proper representative examples.
- IV** Discuss all three types of elimination reactions in detail. Give corresponding reactions.
- 3. Answer in short (any five) [5×5=25]**
- I** What are rearrangement reactions? Discuss cope rearrangement reaction.
- II** Discuss the synthesis of crown ethers.
- III** State Curtin-Hammet Principle.
- IV** Define stereocentres and geometrical isomers.
- V** Write a short note on Birch reduction and cross conjugation.
- VI** What are the consequences of delocalization?
- VII** Discuss the stability order of carbocation.

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Program Name: M.Sc. Chemistry

I Semester / 1st Year Examination

Subject Code: MSc-Chem-101

Subject Name: INORGANIC CHEMISTRY I

[Time : 03:00 Hours]

[Max. Marks : 70]

Note: 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs) [01×15=15]

- I When ethylene reacts with bromine formed
 - (a) Bromo-ethane
 - (b) Dibromo-ethane
 - (c) Tribromo-ethane
 - (d) None of these
- II The electrons present in..... orbitals experiences less repulsive force
 - (a) dz^2
 - (b) dx^2-y^2
 - (c) dxy , dyz and dzx
 - (d) All of these
- III Shape of PCl_5 molecule is
 - (a) Triangular bipyramidal
 - (b) Tetrahedral
 - (c) V-shaped
 - (d) Octahedral
- IV The nature of metal ligand bond depends upon the of metal.
 - (a) Size
 - (b) Electro negativity
 - (c) Both of these
 - (d) None of these
- V The electrons present in orbitals experiences greater force of repulsion
 - (a) dz^2
 - (b) dx^2-y^2
 - (c) Both of these
 - (d) dxy , dyz and dzx
- VI In NH_3 , nitrogen atom is hybridised
 - (a) sp
 - (b) sp^2
 - (c) sp^3
 - (d) sp^3d^2
- VII The Ni^{++} chelate is In water
 - (a) Soluble
 - (b) Insoluble
 - (c) Both of these
 - (d) None of these
- VIII The energy level of doubly degenerate Orbital is highest
 - (a) $1\pi\mu$
 - (b) $1\sigma\mu$
 - (c) $2\sigma g$
 - (d) $2\pi g$
- IX Haemoglobin is a chelate of
 - (a) Magnesium
 - (b) Iron
 - (c) Phosphorus
 - (d) Silicon
- X When a ligand is replaced by water molecule are known as
 - (a) Acid hydrolysis reaction
 - (b) Base hydrolysis reaction
 - (c) Acid-base reaction
 - (d) None of these
- XI Bond angle is electronegativity
 - (a) Directly proportional
 - (b) Indirectly proportional
 - (c) Equal
 - (d) None of these
- XII If the coordinated ligand are π acceptor, the electron transfer is
 - (a) Slow
 - (b) Fast
 - (c) Remains constant
 - (d) None of these

XIII Square planar complex are formed by d^8 system of
(a) $pt(II)$ (b) $PO(II)$ (c) $Ni(II)$ (d) All of these

XIV VSEPR theory was developed by
(a) Gillespie (b) Nyholm (c) Both of these (d) None of these

XV Vitamin B_{12} is a chelate of
(a) Magnesium (b) Iron (c) Phosphorus (d) Cobalt

2. Answer in long (any three) [$10 \times 3 = 30$]

- I** Define the chelate effect with its classification and example in detail.
- II** Explain the adjusted CFT with its application taking the example of octahedral and tetrahedral complexes.
- III** What are electron transfer reactions? Discuss the inner sphere electron transfer reaction with mechanism.
- IV** Explain the substitution reaction in square planar complexes with factors affecting the rate of substitution reaction in square planar complexes.

3. Answer in short (any five) [$5 \times 5 = 25$]

- I** Explain the $d\pi-p\pi$ bonding with example.
- II** Discuss the bent rule.
- III** What do you understand by the term hybridization explain it with its types.
- IV** Discuss the splitting of d -orbital's in tetrahedral complexes according to CFT.
- V** Write down the main features of electron transfer reaction occurring through outer sphere mechanism.
- VI** Discuss the trans effect in brief.
- VII** What is stepwise stability constant? Discuss the relation between stepwise stability constant and overall stability constant.

Paper Code: M.Sc.-Chem-104 A (SVSU:2023-24/R)

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Program Name: M.Sc. Chemistry

I Semester / 1st Year Examination

Subject Code: MSc-Chem-104

Subject Name: BIOCHEMISTRY

[Time : 03:00 Hours]

[Max. Marks : 70]

Note : 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs)

[01×15=15]

- I In fats, the number of OH groups can be expressed as
 - (a) Reichert-Meissil number
 - (b) Polenske number
 - (c) Iodine number
 - (d) Acetyl number
- II Which of the following is the general formula of Carbohydrates?
 - (a) $(C_4H_2O)_n$
 - (b) $(C_6H_2O)_n$
 - (c) $(CH_2O)_n$
 - (d) $(C_2H_2O)_n COOH$
- III A plant cell wall is mainly composed of
 - (a) Protein
 - (b) Cellulose
 - (c) Lipid
 - (d) Starch
- IV Which of the following disaccharides does not consist of two glucose units?
 - (a) Trehalose
 - (b) Cellobiose
 - (c) Isomaltose
 - (d) Lactulose
- V Which of the following plasma protein is not synthesized in the liver?
 - (a) Albumin
 - (b) Transferrin
 - (c) Ceruloplasmin
 - (d) von Willebrand factor
- VI Which of the following enzyme is the rate-limiting enzyme of bile acid synthesis?
 - (a) 7-alpha-hydroxylase
 - (b) 12-alpha-hydroxylase
 - (c) 12-beta-hydroxylase
 - (d) 5-beta isomerase
- VII Where are the enzymes for β -oxidation present?
 - (a) Nucleus
 - (b) Cytosol
 - (c) Mitochondria
 - (d) Golgi apparatus
- VIII DNA replication is
 - (a) Conservative
 - (b) Conservative and discontinuous
 - (c) Semi-conservative and discontinuous
 - (d) Semi-conservative and semi-discontinuous
- IX Identify the simple lipid from the following?
 - (a) Lecithin
 - (b) Fatty acid
 - (c) Triacylglycerol
 - (d) Steroids
- X All of the following are complex lipids, Except?
 - (a) Phosphatidic acid
 - (b) Cerebroside
 - (c) Cardiolipin
 - (d) Cholesterol

- XI** Which of the following enzymes separates the two strands of DNA during replication?
 (a) Linolenic acid (b) Palmitic acid
 (c) Linoleic acid (d) both (a) and (c)
- XII** The abundantly distributed enzyme in germinating seeds and adipocytes is
 (a) Lipase (b) Proteases (c) Cellulase (d) Nuclease
- XIII** Which of the following is not a polysaccharide?
 (a) Cellulose (b) Stachyose
 (c) Starch (d) Glycogen
- XIV** The term cell was given by
 (a) Robert Hooke (b) Tatum
 (c) Schwann (d) Bary
- XV** Which of the following plasma protein is not synthesized in the liver?
 (a) Albumin (b) Transferrin
 (c) Ceruloplasmin (d) von Willebrand factor

2. Answer in long (any three) [10×3=30]

- I** What is the difference between catabolism and anabolism?
- II** What do you mean by lipids? How many types of lipids? Explain in detail.
- III** What do you mean by triacylglycerols? Explain the dietary triacylglycerols.
- IV** What is cell? Discuss the structure of prokaryotic cells.

3. Answer in short (any five) [5×5=25]

- I** Describe the bases of DNA and RNA.
- II** Write the short note on essential amino acids.
- III** Write the biochemical functions of cholesterol.
- IV** Define energy rich compounds and classify with suitable examples.
- V** How many types of DNA? Explain.
- VI** What is bile acid? Explain the synthesis of bile acids.
- VII** What do you mean by glucogenic amino acids? Explain.