Roll No. .... **Total Pages : 03**

LMDQ/D-23 **6531**

INORGANIC CHEMISTRY (GENERAL)
CHEM-301
(CBCS-LOCF)

Time : Three Hours] [Maximum Marks : 45

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) Explain the structure and function of Hemerythrin. **3**

(b) Write and explain the ilkovic equation. **2**

(c) What is the interference of O_2 in the determination of Metal ion in polarography ? **2**

(d) Define the terms vertical and adiabatic ionization. **2**

Unit I

2. (a) Describe the basic structural features of hemoglobin and myoglobin and explain their biological functions. **5**

(b) Explain that cytochrome p-450 is a monooxygenase. **4**

3. (a) What are the electron carriers ? Describe the role of iron-Sulphur proteins as electron carrier in biological system. **5**

(b) Write a short note on model synthetic complexes of cobalt. **4**

Unit II

4. (a) Explain the determination of coordination number of complexes with the help of $E_{1/2}$. **4**

(b) Describe the term hydrogen voltage and explain its volume, Erdy and Gruss theory. **5**

5. (a) Determine and depict the IR active modes of SF_4 (AX_4 type) by using group theoretic approach. **5**

(b) On the basis of IR spectroscopy, explain the coordination behavior of β-diketones with transition metal ions. **4**

Unit III

6. (a) Explain the term isomer shift and quadrupole splitting in Mossbauer. **4**

(b) Define photoelectric effect. Draw and explain the possible peaks for N_2 molecule in photoelectron spectrum. **5**

7. (a) Give the principle of ESCA. What chemical information is obtained from ESCA ? **5**

(b) Explain the adiabatic and vibrational ionization energies in PES by using vibrational structure for a molecule. **4**

(b) Discuss the Mc-Connell equation and its application by taking suitable example.

(c) Discuss the hyperfine structure in ESR spectra of an electron interacting with two non-equivalent protons. [Hint : Use 'stick diagram' and take $a_1 > a_2$]

(d) List the factors which determine the suitability of a nucleus for investigation by NMR spectroscopy.

3,2,2,2

Section C

6. (a) Draw stereogram corresponding to the following combination of symmetry elements :

(i) $\overline{3}\,m$

(ii) $\overline{4}+i$

(iii) $\frac{3}{m}$

(iv) $3m$.

Also state for each case, which point group is generated ?

(b) Draw space group diagram for Pm. Specify the coordinates of general positions.

(c) Why is 2_1 called a neutral axis ? **5,2,2**

Roll No. .... **Total Pages : 05**

LMDQ/D-23 6532

PHYSICAL CHEMISTRY GENERAL
CHEM-302

Time : Three Hours] [Maximum Marks : 45

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. **1** is compulsory. All questions carry equal marks.

1. This question is compulsory :

(i) What is the basic criteria for a molecule to be IR active ?

(ii) Why is there no translational spectroscopy ?

(iii) Express in eV, the thermal energy of a gaseous molecule at 298 K.

(iv) Why is NQR observed in solid state ?

(v) A NMR frequency is approximately equal to 60 MHz. Calculate the corresponding energy in kJ/mol.

(vi) Why are ESR signals plotted in first-derivative mode ?

(vii) In tetragonal crystal system, A-centred lattice does not exist. Why ?

(viii) Prove $\overrightarrow{a^*}.\vec{a} = 1$ and $\overrightarrow{b^*}.\vec{b}. = 0$

(ix) What is the index used to determine the accuracy of a structure after refinement ? Give corresponding expression. **1×9=9**

Section A

2. (a) Show that for a diatomic rigid rotor, the moment of inertia is given by $I = \mu r^2$, where symbols have their usual meaning. Discuss how are molecules classified based on their principal moments of inertia ? Give one example for each group.

(b) The rotational spectra of $^{79}Br^{19}F$ shows a series of equidistant lines 0.71433 cm^{-1}. Determine the energy of $J = 9 \rightarrow J = 10$ transition.

(c) What are the degeneracies of the following diatomic rotational energy levels : **5,2,2**

(i) 0

(ii) $\frac{6\hbar^2}{I}$

3. (a) The fundamental vibrational frequency of $H^{35}Cl$ is 2890 cm^{-1}. Calculate the force constant of a molecule in Nm^{-1}.

(b) Discuss the quantum theory of Raman scattering.

(c) Elaborate with an example, the concept of 'zero-point energy'. **4,3,2**

Section B

4. (a) Explain with energy level diagram, the operating principle of NMR spectroscopy. Based on this diagram, justify why do nuclei such as ^{12}C, ^{16}O do not show NMR spectra.

(b) Explain the following terms :

(i) Chemical shift

(ii) Spin-spin coupling constant

(iii) Spin-Lattice relaxation. **4,5**

5. (a) Calculate number of ESR lines in the following free radicals :

(i) Pyrazine

(ii) n-propyl

(iii) $^{13}CF_2D$.

7. (a) Using reciprocal lattice concept, derive expression for interplanar spacing in case of cubic crystal system and determine the ratio $\frac{d_{112}}{d_{321}}$?

(b) Write down expression of structure factor for body-centered lattice and derive the corresponding condition for systematic absences. Justify here which *hkl* reflection will be observed at smallest value of θ ?

(c) Powder XRD pattern of cubic crystal gives the following three peaks :

2θ : 43.16; 50.30; 73.99

Index these reflections. **3,3,3**

7. (a) Using reciprocal lattice concept, derive expression for interplanar spacing in case of cubic crystal system and determine the ratio $\frac{d_{112}}{d_{321}}$?

(b) Write down expression of structure factor for body-centered lattice and derive the corresponding condition for systematic absences. Justify here which *hkl* reflection will be observed at smallest value of θ ?

(c) Powder XRD pattern of cubic crystal gives the following three peaks :

2θ : 43.16; 50.30; 73.99

Index these reflections. **3,3,3**

3. (a) How is UV-Visible spectroscopy helpful in detection of functional group in organic compounds ? **3**

(b) Discuss the different ionisation techniques being used in mass spectrometry, highlighting the advantages and disadvantages of each. **6**

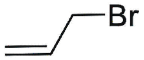
Section B

4. (a) [18] Annulene shows two signals in its ^{1}H-NMR spectrum, one at 9.25 ppm and other upfield at – 2.88 ppm. What hydrogens are responsible for each of the signals ? Also discuss about the factor responsible for these chemical shift values. **3**

(b) How the ^{1}H-NMR spectra of four isomeric forms of compounds with molecular formula $C_3H_6Br_2$ differ ? **3**

(c) How many signals will you get in the ^{1}H-NMR of the following compounds and mention the expected multiplicity for each proton ? **3**

(i)



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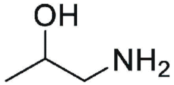

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LMDQ/D-23 **6533**

ORGANIC CHEMISTRY GENERAL
CHEM-303

Time : Three Hours] [Maximum Marks : 45

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. Q. No. **1** is compulsory. All questions carry equal marks.

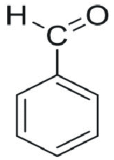
(Compulsory Question)

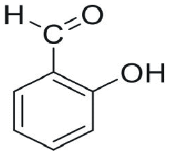
1. (a) Why is an O-H stretch more intense than N-H stretch in IR ? **1**

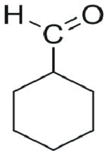
(b) How an increase in solvent polarity shift n–π* and n–σ* absorption bands ? **1**

(c) Arrange the following compounds in order of decreasing frequency of carbonyl absorption in their IR spectra : **1**

(i)



(ii) 

(iii) 

(d) Primary alcohols have a strong peak at m/z = 31. What fragment is responsible for this peak ? **1**

(e) What m/z value would you predict for the base peak in the mass spectrum of 3-methyl pentane ? **1**

(f) A signal has been reported to occur at 120 Hz downfield from TMS in an NMR spectrometer with a 300-MHz operating frequency. Then : **2**

(i) What is its chemical shift ?

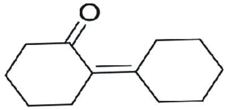
(ii) What would its chemical shift be in an instrument operating at 100 MHz ?

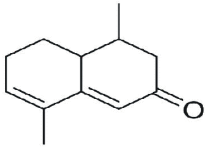
(iii) How many Hz downfield from TMS would the signal be in an 100 MHz spectrometer ?

(g) Compound A, with molecular formula C_4H_9Cl, shows two signals in its ^{13}C-NMR spectrum. Compound B, an isomer of compound A, shows four signals and in the spin coupled mode, the signal most downfield is doublet. Identify compounds A and B. **2**

Section A

2. (a) Using Woodward and Fisher's rule, calculate the expected is λ_{max} for the given compounds : **3**

(i) 

(ii) 

(b) Discuss the fragmentation pattern of 4-n-butyltoluene involving (i) benzylic fission, (ii) the McLafferty rearrangement. Label the ions formed as cations or radical cations along with their masses. **3**

(c) What identifying characteristics would be present in the mass spectrum of a compound having single halogen atom or more halogens of same kind or different kinds ? **3**

7. (a) Briefly introduce the terms (i) Fermi resonance and (ii) Overtones, used in IR spectroscopy with suitable examples. **3**

(b) Deduce the structure of a compound of molecular formula C_3H_7NO with the following spectral data : **6**

M.F. C_3H_7NO

UV : λ_{max} 238 nm, ε_{max} 10500

IR : ν_{max} cm^{-1} 3428, 2941-2857, 1681 and 1452

^1H NMR : δ 1.9 (3H, s), 2.7(3H, s) and 8.13 (1H, s)

^{13}C-NMR (off resonance decoupled) : Two quartets and one singlet.

The singlet at δ 176.

5. Briefly discuss the following :

(a) Virtual coupling **3**

(b) Nuclear Overhauser effect **3**

(c) Simplification of complex NMR spectra through chemical methods. **3**

Section C

6. (a) How proton noise decoupled ^{13}C-NMR spectroscopy be used to distinguish the following : **3**

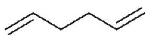
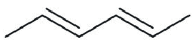
(i) 1,2-, 1,3-, and 1,4-dinitrobenzenes

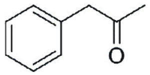
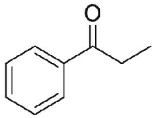
(ii) 1-Methylcyclohexene and 1-Methylenecyclo-heaxne

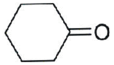
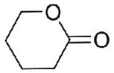
(iii) Acetone and Methylacetate

(b) Compare the sensitivity and chemical shifts values of ^1H and ^{13}C-NMR spectroscopy. **3**

(c) How is IR spectroscopy used to differentiate the following : **3**

(i)  and 

(ii)  and 

(iii)  and 

Roll No. .... **Total Pages : 03**

LMDQ/D-23 6534

INORGANIC CHEMISTRY SPECIAL–I
CHEM-304

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Comments on the lability or inertness of the following complexes with justification : **6**

(i) $[Cr(H_2O)_6]^{2+}$

(ii) $[Cr(CN)_6]^{4-}$.

(b) Discuss in brief about the theories of trans effect. **6**

2. (a) Discuss the stereochemical changes in the acid hydrolysis of Co(III)-ammine Complexes. **6**

(b) Write down the mechanism of preparation of nitrito derivative of $[Co(NH_3)_5Cl]^{2+}$ with explanation. **6**

Section B

3. (a) Explain the following : **3+3**

(i) Mixed valance complexes and their electron transfer processes

(ii) Non-complimentary redox reactions.

(b) Discuss the mechanism of electron transfer reaction with reference to inner sphere reactions. **6**

4. (a) What are cross-reactions ? Give *two* examples of such reactions and explain the evaluation of their rate constants with good degree of accuracy. **6**

(b) The electron transfer between $[Co(CN)_6]^{4-}$ + $[IrCl_6]^{2-}$ is relatively fast. Although both Cl^- and CN^- are good bridging ligands. **6**

Section C

5. (a) Discuss the base hydrolysis reaction of coordinated nitriles and its bonding with transition metals. **6**

(b) Give a brief account of redistribution reactions involving exchange of ligands between two molecules of the same type. **6**

6. (a) Discuss the nucleophilic substitution reactions of coordinated hydrocarbons. **6**

(b) What is fluxional isomerism ? Explain fluxional behaviour in allylic and cyclopentadienyl organometallic complexes. **6**

Section D

7. (a) Give preparation and properties of silicone elastomers. **6**

(b) Discuss the structure and bonding in polyphosphazenes. Give its chemical reactions with water and ammonia. **6**

8. (a) Acetic acid is a weak acid and nitric acid is a strong acid in aqueous solution, but both behave as base in sulfuric acid. Explain. **6**

(b) What is the aprotic solvent system concept of acids and bases ? Ferric chloride exhibits acidic behaviour in phosphoryl chloride solvent. Explain. **6**

Roll No. .... **Total Pages : 03**

LMDQ/D-23 6535

INORGANIC CHEMISTRY SPECIAL–II
CHEM-305

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Explain the synthesis of σ-bonded organometallic compounds by metal alkene nucleophile interaction and elimination reactions. **8**

(b) Define in brief about the fluxionality in organometallic compounds. **4**

2. (a) Write the reactions of organo-copper compounds with α, β-unsaturated carbonyls and epoxides with mechanism. **8**

(b) Explain the β-hydrogen elimination decomposition pathway in σ-bonded organometallic compounds. **4**

Section B

3. (a) Discuss the structure and bonding in Schrock type carbene complexes. **6**

(b) Give any *three* methods of preparation of metal hydrides. **6**

4. (a) Differentiate between Fischer and Schrock type carbene compounds. **6**

(b) Give any *three* methods of preparation of Fischer carbene complexes. **6**

Section C

5. (a) Complete the following reactions : **6**

(i) $\mathrm{Mn}\left(\eta^5 - C_5H_5\right)_2 \xrightarrow{3CO}$

(ii) $\mathrm{Mn}\left(\eta^5 - C_5H_5\right)_2 \xrightarrow{2H_2O}$

(iii) $\mathrm{Ni}\left(\eta^3 - C_3H_5\right)_2 \xrightarrow{CO_2}$.

(b) Give any *three* methods for the synthesis of transition metal cyclopentadienyls. **6**

6. (a) Give any *two* methods of preparation of η^2-alkene metal complexes. **6**

(b) Write *three* reactions of η^2-alkyne metal complexes with electrophiles. **6**

Section D

7. (a) Explain the mechanism of hydrogenation of alkene using Wilkinson catalyst. **6**

(b) Discuss the hydroformylation of alkene by using Rhodium catalyst. **6**

8. (a) Write a brief note on the activation of C.H bond. **6**

(b) Give the mechanism of polymerization of propylene using Zeigler-Natta catalyst. **6**

Roll No. .... **Total Pages : 03**

LMDQ/D-23 **6536**

PHYSICAL CHEMISTRY (Special-I)
CHEM-304 (CBCS-LOCF)

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Describe the general procedure to obtain the energy and the eigenfunction of a system up to first order correction by perturbation method. **8**

(b) What is Born-Oppenheimer approximation ? Under what condition is this approximation applicable ? **3**

(c) The trial function, $\varphi(x) = x(a - x)$. At the boundaries, $\varphi(0) = 0$ and $\varphi(a) = x(a - a) = 0$. Thus, φ satisfies these boundary conditions. Justify. **1**

2. (a) What are symmetric and antisymmetric solution of hydrogen molecule ion (H_2^+) ? **7**

(b) Write a note on "spin-orbit coupling". **2**

(c) Write the term symbol for the electronic configuration :

(i) $1s^2 2s^2 2p^4$

(ii) Term symbol for the ground state of nitrogen atom. **3**

Section B

3. (a) Compare the molecular orbital and valence bond treatments of hydrogen molecule in the ground state. **6**

(b) Discuss the molecular orbital treatment of heteronuclear diatomic molecules with examples. **6**

4. (a) What are hybrid orbitals ? Describe the quantum mechanical treatment for bond formation in ethylene molecule. **6**

(b) With the help of Hückel's rule, show that cyclopropenyl cation is more stable than its anion or radical. **6**

Section C

5. (a) Neatly draw Jablonsky diagram and label it with its various transitions that can occur after a molecule has been excited photochemically. With the diagram, explain why phosphorescence life time is much longer than fluorescence. **8**

(b) How do you correlate selection rules and transition moment integral ? Explain. **4**

6. (a) What is oscillator strength in spectroscopy ? How is absorption intensity related to oscillator strength ? **4**

(b) Discuss about Einstein's coefficient of absorption and emission phenomenon. **5**

(c) Write a note on " Probability of Induced Emission and its Application to Lasers". **3**

Section D

7. (a) What is a surface active agents ? Discuss the different types of surface active agents with examples. **6**

(b) Explain the terms 'Micellization' and 'Critical micellar concentration'. How the mass action model can be used to discuss micellization ? **6**

8. (a) Discuss briefly the different types of intermolecular forces in liquids. **5**

(b) What is the physical interpretation of internal pressure ? Discuss the significance of internal pressure in liquids. **4**

(c) Give a brief account about 'Liquids as disordered solids'. **3**

Roll No. .... **Total Pages : 03**

LMDQ/D-23 6537

PHYSICAL CHEMISTRY SPECIAL-II
CHEM-305

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks. Calculator is allowed for solving numerical only.

Section A

1. (a) What do you mean by phase space, representative point and ensembles ? **4**

(b) Using Lagrange's method of undetermined multipliers derive an expression for Maxwell-Boltzmann Statistics. **8**

2. (a) Differentiate microcanonical, canonical and grand canonical ensembles. **3**

(b) Derive a relation for Maxwell distribution law of velocities from Boltzmann distribution expression. 7

(c) Particles to be distinguished in 2 boxes such that box 1 contains 30 particles and box 2 contains 26 particles. Find the number of ways of distribution. **2**

Section B

3. (a) Derive and expression for B.E statistics showing its deviation from ideal gas when B > 1. **5**

   (b) Why is He more degenerate than Hydrogen for B.E statistics ? **3**

   (c) Describe the case of degeneration for Fermi Dirac system when α of e^{α} is positive. **4**

4. (a) Illustrate thermionic emission of electron from metals for F.D statistics. **9**

   (b) Comment on the degeneracy of classical and quantum mechanical objects. **3**

Section C

5. (a) Derive an expression for translational partition function of gas and also derive Sackur Tetrode equation. **8**

   (b) The rotational constant of gaseous HCl, determined from microwave spectroscopy is 10 cm^{-1}. Calculate rotational partition function of HCl at 25°C. **2**

   (c) What do you understand by characteristic vibrational temperature ? **2**

6. (a) Derive an expression of relationship of internal energy of system in terms of partition function and absolute temperature. **6**

   (b) What are the postulates of statistical thermodynamics ? What is significance of Boltzmann constant ? **3**

   (c) The vibrational frequency of a homonuclear diatomic molecule is v. Calculate the temperature at which the population of the first excited state will be half that of the ground state. **3**

Section D

7. (a) Derive a relationship between Partition function and equilibrium constant. How is this relationship helpful in understanding Activated complex theory ? **5**

   (b) Determine pre exponential and steric factor for the system :

   Atom + Linear molecule $\rightleftharpoons$ Linear molecule

   Linear molecule + Linear molecule $\rightleftharpoons$ Nonlinear molecule **7**

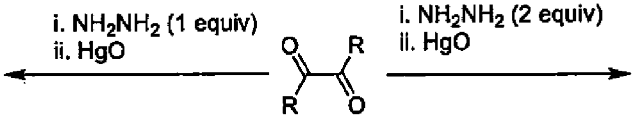
8. (a) What are the forces and fluxes in irreversible Thermodynamics ? How are they related ? Explain with examples. **3**

   (b) Derive an expression for :

   (i) Entropy production in matter flow.

   (ii) Entropy production in current flow. **6**

   (c) What is Onsager Reciprocal Relationship ? **3**

(iii) 

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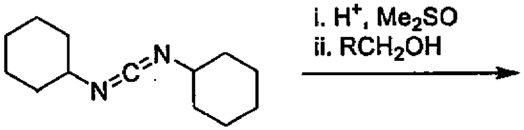
6. Rationalize the following transformation with a suitable mechanism :

(i) 

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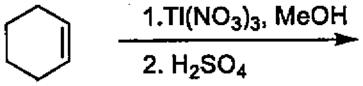
(ii) 

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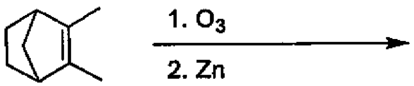
(iii) 

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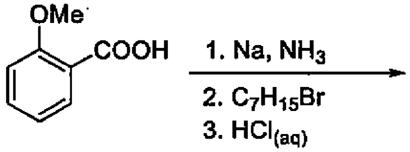
Section D

7. Write the product and mechanism of the following reactions :

(i) 

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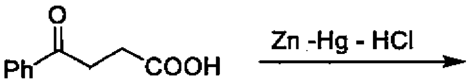
(ii) 

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Roll No. .... **Total Pages : 05**

LMDA/D-23 6538

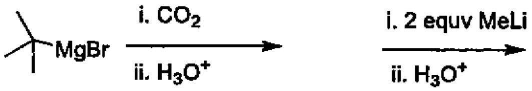
ORGANIC CHEMISTRY SPECIAL-I
CHEM-304

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. Write product of the following transformations and propose a mechanism for each transformation to explain the observed regioselectivity and stereochemistry.

(i) 

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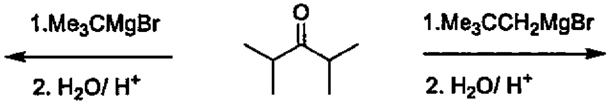
(ii) 

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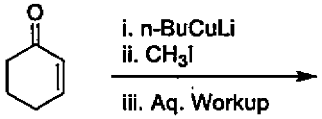
(iii) 

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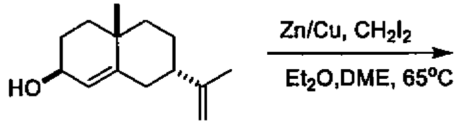
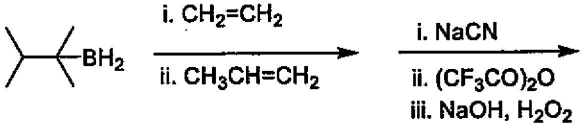
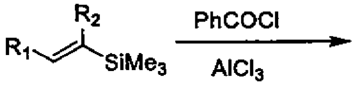
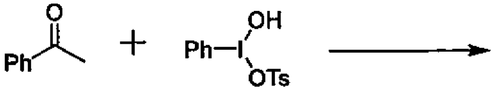
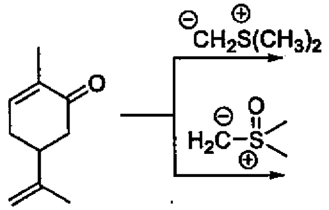
(iv)  3

2. Complete the following organic reactions and propose a mechanism for each transformation to explain the observed regioselectivity and stereochemistry.

(i)  3

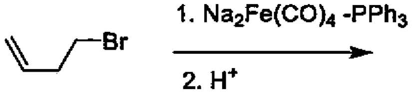
(ii)  3

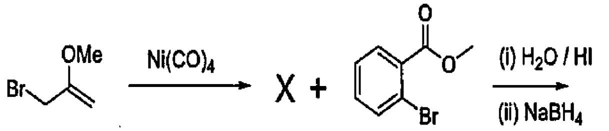
(iii)  3

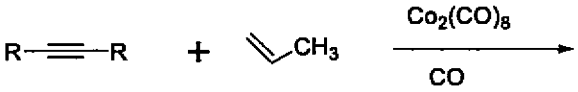
(iv)  3

Section B

3. Complete the following chemical conversion with suitable mechanism :

(i)  4

(ii)  4

(iii)  4

4. Explain the role of the following organometallic reagent in carbon-carbon bond forming reaction.

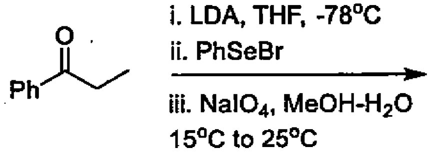
(a) Reaction of σ-organochromium 4

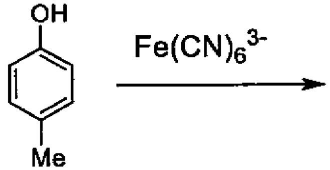
(b) Tebbe Reagents 4

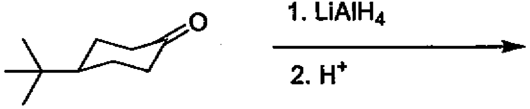
(c) (η^2-alkene)palladium(II) complex. 4

Section C

5. How will you carry out the following reactions and suggest a suitable mechanism :

(i)  4

(ii)  4

(iii) 

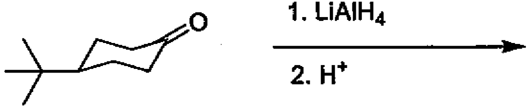
4

8. Explain the following with suitable example(s) and mechanism :

(i) Rosenmund's Reduction. 4

(ii) Reductive amination. 4

(iii) Why reduction of alkynes by electron transfer method gives trans-product ? 4

(iii) 
4

8. Explain the following with suitable example(s) and mechanism :

(i) Rosenmund's Reduction. 4

(ii) Reductive amination. 4

(iii) Why reduction of alkynes by electron transfer method gives trans-product ? 4

Section D

7. Discuss the mechanism of the the following reactions : **4×3**
   (a) Barton reactions
   (b) Photofries rearrangement
   (c) Di-π-methane rearrangement.

8. (a) Discuss the possible products after photo-irradiation of α-santonin. Give mechanistic details.
   (b) Discuss the formation of products giving suitable mechanism after photo-irradiation of benzene. **6+6**

Roll No. .... **Total Pages : 04**

LMDQ/D-23 6539

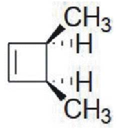
ORGANIC CHEMISTRY SPECIAL-II
CHEM-305

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Predict the product of cycloaddition of ethylene and cis-2-butene, addition being supramolecular on both the reactants. State under which condition (thermal or photochemical) the reaction will be symmetry allowed.
   (b) The following compound can open by two conrotatory modes. Predict the products in each case and state which one will be formed predominantly.



12

2. (a) Giving proper reasoning, predict the reaction condition for disrotatory interconversion of 1,3,5-hexatriene $\rightleftharpoons$ cyclohexadiene.

(b) Predict the products and give mechanism for their formation for the following reactions :

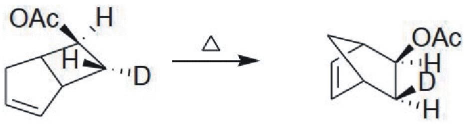
(i)

(ii)

12

Section B

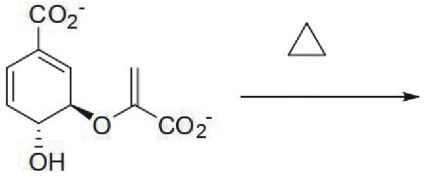
3. (a) Write down the mechanism for the following rearrangement :



(b) With the help of a suitable example discuss Sommlet-Houser and cope rearrangement. 12

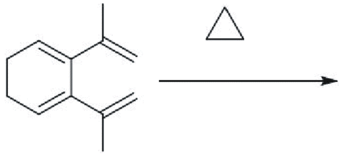
4. Giving justification, predict the products in the following reactions under given reaction conditions : 4×3

(i)



(ii)

(iii)

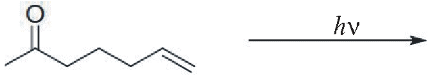


Section C

5. (a) Draw and discuss Jablonski diagram.

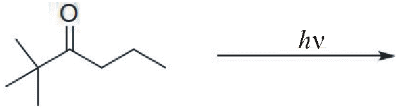
(b) Giving mechanism, predict the products of the photolysis of $(CH_3)_3CO(CH_3)_3$.

(c) Giving mechanism, predict the product(s) in the following reaction :



4×3

6. (a) Giving mechanism, predict the product(s) of the photolysis of following ketone :



(b) Predict the product(s) when a solution of benzophenone in isopropyl alcohol is irradiated at 345 nm.

(c) Discuss the photodimerisation of 1,3-butadiene.

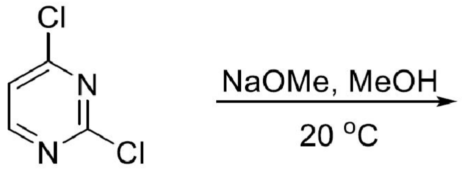
4×3

Section D

7. Sketch an important method for the synthesis of guanine and caffeine. **12**

8. (a) Give the general methods for the structural determination of quercetin.

(b) Write down the product(s) of the following reaction. Also sketch the mechanistic pathway : **8,4**



Roll No. .... **Total Pages : 04**

LMDQ/D-23 **6540**

PHARMACEUTICAL CHEMISTRY
SPECIAL–I
CHEM-304
(CBCS-LOCF)

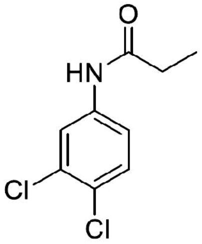
Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Discuss synthetic equivalents and FGI with examples.

(b) Analyze the molecule using disconnection approach :

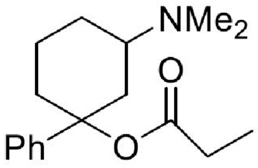


(c) Discuss one group C-X disconnection of acid derivatives. **4,4,4**

2. (a) What do you understand by masked H_2S equivalent ? Explain.

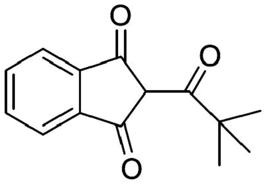
(b) Define and discuss reversal of polarity.

(c) Disconnect the molecule to propose a suitable synthetic method : **4,4,4**



Section B

3. (a) Disconnect the compound using synthon approach :



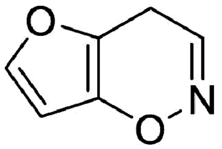
(b) Explain the application of synthon approach in the synthesis of nafimidone. **5,7**

4. (a) Apply synthon approach in the synthesis of propanolol.

(b) Describe the role of (i) THP and (ii) Cbz as protective groups. **5,7**

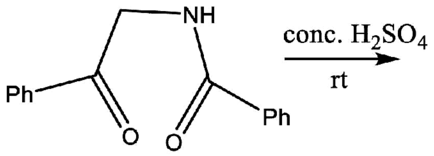
Section C

5. (a) Write the systematic name of :



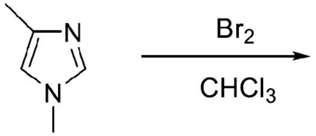
(b) How will you synthesize pyrazole starting from acetylacetone ?

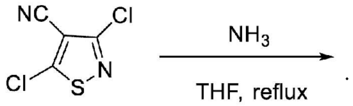
(c) Complete the reaction. Also discuss the mechanism : **3,5,4**



6. (a) Discuss the reactivity of 1, 2- and 1, 3-azoles towards nucleophilic reactions.

(b) Write the product(s)/mechanism : **4,8**

(i)


(ii)


Section III

5. Discuss antipyretic agents in detail.

6. Write the synthesis of the following :

(i) Celecoxib

(ii) Diclofenac, and biosynthesis of eicosanoid.

Section IV

7. Give recent advances of hormonal contraceptives in detail.

8. Discuss calcium channel blockers and synthesis of clonidine and diltiazem.

Roll No. .... **Total Pages : 02**

LMDQ/D-23 **6541**

PHARMACEUTICAL CHEMISTRY
SPECIAL-II
CHEM-305

Time : Three Hours] [Maximum Marks : 60

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section I

1. Explain the general mode of action, medicinal uses and synthesis of Thiotepa and 6-mercaptopurine drugs.

2. Discuss antimalarial agents and mode of action of nucleoside reverse transcriptase inhibitors for AZT and ddC.

Section II

3. Give synthesis, SAR, mechanism of action of sulphonamides.

4. Illustrate structure, mode of action, synthesis of azithromycin and ampicillin.