



PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of health science

**Bachelor of Science honours in Industrial
Pharmaceutical Sciences**

Year 2 – Semester I

Document Control & Approving Authority	Senior Director – Quality Management & Administration
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1 st Issue Date: 2017.01.30	Revision No.00	Revision Date: 12.01.2023	Validated by: Librarian
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Faculty of Health Sciences
Bachelor of Science Honours in Industrial Pharmaceutical Sciences
IPS 2133 – Physical Pharmacy
Batch 05
2nd year 1st semester
End Semester SEQ Examination

INDEX NUMBER:

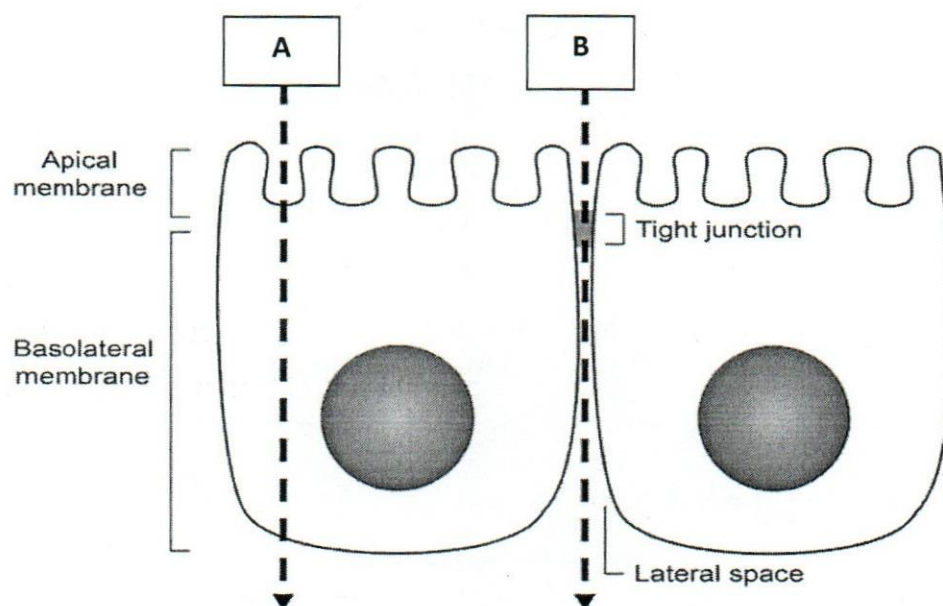
Date : 13th September 2022
Time : 9.00 a.m. – 11.00 a.m.(2 hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01**(100 marks)**

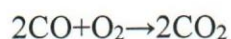
- 1.1. What is a true solution? (10 marks)
- 1.2. State **04** colligative properties of a solution. (20 marks)
- 1.3. Find the molarity of 500 ml of a solution which contain 60 g of NaOH dissolved in water.
Molar mass of NaOH is 40 g/mol. (20 marks)
- 1.4. 25.3 g of KNO₃ was dissolved in 125 ml of water. What is the molality of the solution?
(Molar mass of KNO₃ = 101.1 g/mol, density of water = 1.00 g/ml) (20 marks)
- 1.5. Identify the following **A** and **B** diffusion pathways. (10 marks)



- 1.6. Compare and contrast the named diffusion pathways in the above figure. (20 marks)

Question 02**(100 marks)**

- 2.1. State the types of thermodynamic systems. (06 marks)
- 2.2. Compare the differences between a closed and an open system. (10 marks)
- 2.3. Indicate **04** processes in thermodynamics. (20 marks)
- 2.4. Name the terms H, U, PV, q, w, G, T, S in the following equations which are given for any system under all conditions. (24 marks)
- $H = U + PV$
 - $U = q + w$
 - $G = H - TS$
- 2.5. Find ΔG° at 25°C for the reaction given below. Explain whether the reaction would occur spontaneously. (40 marks)



- $\Delta H^\circ = -128.3 \text{ kJ}$
- $\Delta S^\circ = -159.5 \text{ J K}^{-1}$

Question 03**(100 marks)**

- 3.1. What is an induced polarization? (20 Marks)
- 3.2. Write **03** applications of RI and Abbe's refractometer. (15 marks)
- 3.3. The molar refraction of the compound $\text{C}_2\text{H}_5\text{—CO—CH}_3$ is 19.998 while for the compound $\text{CH}_3\text{—CH=CH—CH}_2\text{—OH}$ it is 18.7. Discuss the reasons for this difference in the molar refraction. (35 marks)
- 3.4. Compare and contrast the ion-ion forces and van der waals forces. (30 marks)

Question 04**(100 marks)**

- 4.1. State whether a weakly acidic drug would precipitate, if the pH of the system is decreased to pH = 3. Justify your answer. (20 marks)
- 4.2. Identify the importance of adjusting the osmotic pressure of pharmaceutical solutions that are delivered to membranes of the body. (20 marks)
- 4.3. Briefly describe **04** methods of adjusting tonicity. (30 marks)
- 4.4. Briefly describe the following. (30 marks)
- a. Buffer capacity
 - b. Biological buffer systems



CINE Campus (Pvt) Ltd

Approved for Quality Management System

Faculty of Health Sciences

Bachelor of Science Honours in Industrial Pharmaceutical Sciences

IPS 2143/ BCS 2143 Organic Chemistry

Batch 05

2nd year 1st semester

End Semester SEQ Examination

INDEX NUMBER:

Date: 15th of September 2022

Time: 09.00 am – 12.00 pm - Three Hours

INSTRUCTIONS TO CANDIDATES

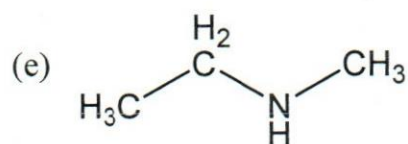
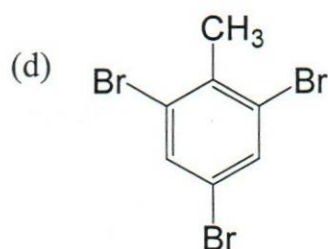
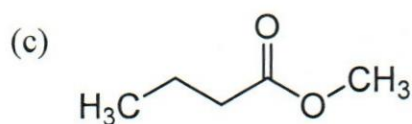
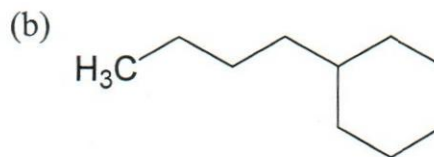
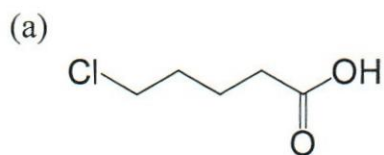
- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 1

(100 marks)

1.1 Name the following structures in IUPAC nomenclature.

(20 marks)



1.2 Draw the structures corresponding to the following IUPAC names.

(20 marks)

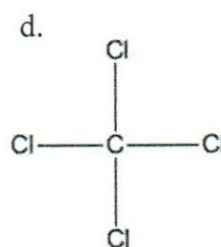
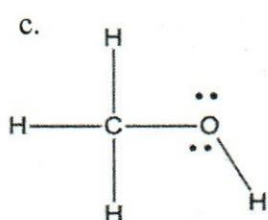
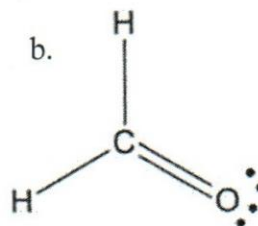
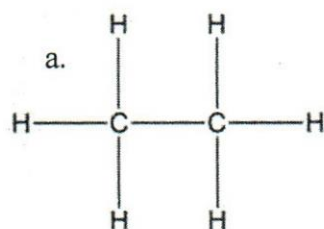
- 3-(N-methylamino)butanoic acid
- 3-methyl-2-phenyloctane
- 2,4,6-Trinitrotoluene
- 3-hydroxyprop-2-enal
- 2-methylheptan-3-one

1.3 Identify the alkene obtained on dehydration of following alcohols. (You may draw the structure of the product in your answer sheet)

(20 marks)

- 3-ethyl-3-pentanol
- 2-propanol

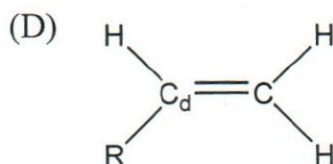
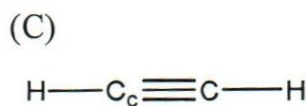
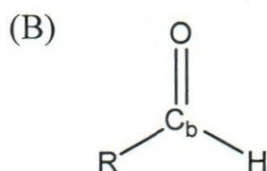
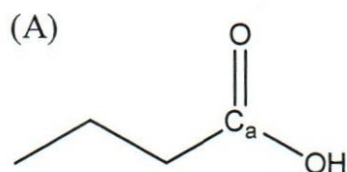
1.4 Comment on the polarity of the molecules given below and briefly indicate the reason for your answer for each molecule. (40 marks)



Question 02

(100 marks)

2.1. Determine the oxidation states on the carbon atoms (C_a , C_b , C_c , C_d) of following organic molecules. (10 marks)



2.2. Classify each of the following reactions as an addition, elimination, substitution, or rearrangement. (20 marks)

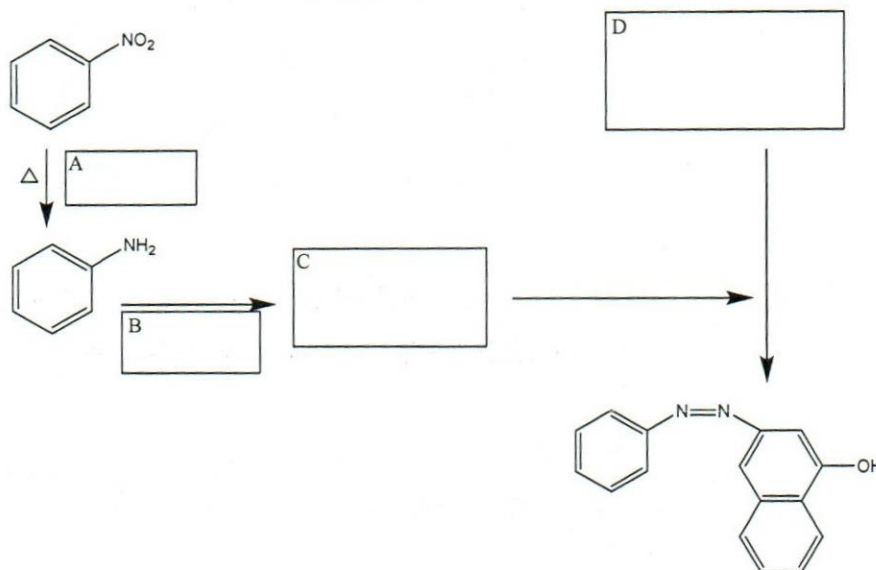




2.3. Consider the reaction between 2-bromopropane and NaOH. Write down products that you would obtain in following conditions. (30 marks)

a. Ethanol as reaction medium and high temperature.

2.4. Predict the structure of (A), (B), (C), (D) and (E) (40 marks)

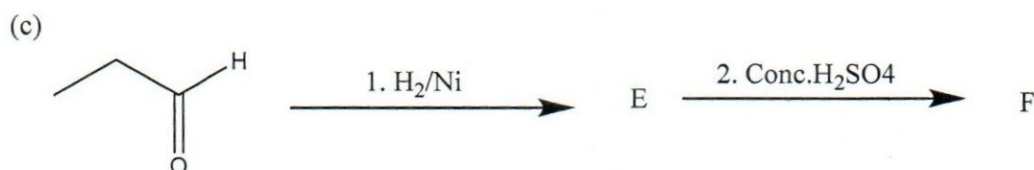
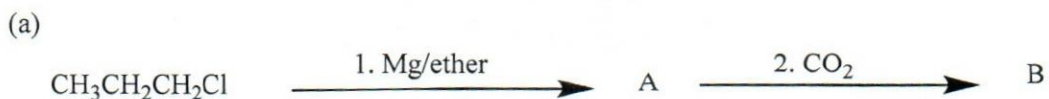


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Question 03

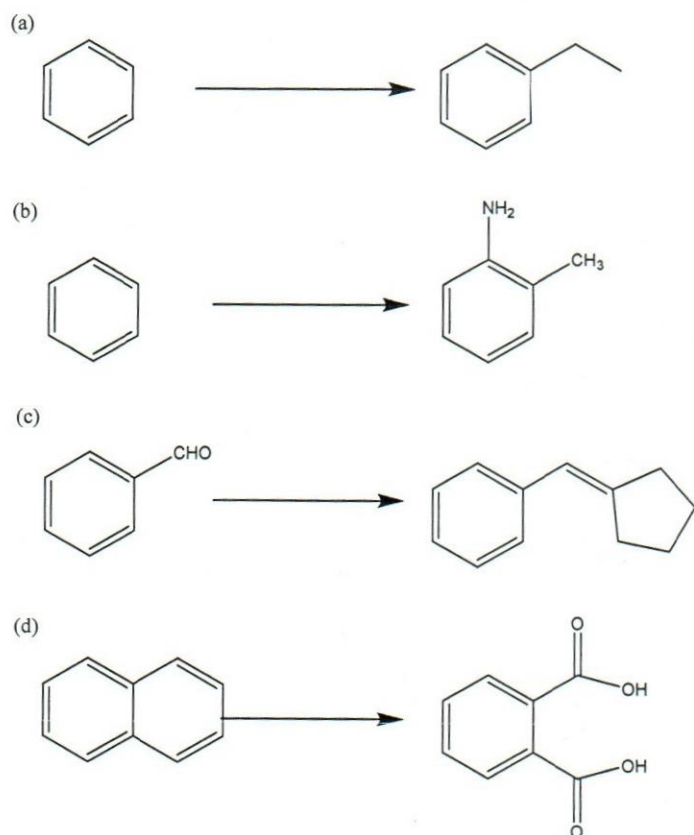
(100 marks)

3.1 Write the products (A to F) of the following reactions. (30 marks)



3.2 How would you synthesis the following organic compounds using any other reagents?

(50 marks)



3.3 Compare and contrast the water solubility of following organic molecules by giving reasons. (20 marks)

- (a) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3CHO
 (b) $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{CH}_3\text{CH}_2\text{F}$

Question 04.

(100 marks)

4.1 Draw the Newman projection of staggered and eclipsed conformations of the following molecules. (20 marks)

- a. $\text{Cl-CH}_2\text{-CH}_2\text{-Cl}$
 b. $\text{OH-CH}_2\text{-CH}_2\text{-CH}_3$

4.2 Consider the molecule $\text{CH}_3\text{-CH}_3$ (ethane). Sketch the graph of the rotational barrier in ethane as a function of dihedral angle. (30 marks)

4.3 Draw compounds that contain the following. (20 marks)

- a. A primary alcohol
- b. A tertiary amine
- c. Both primary and secondary alcohol
- d. Quaternary carbon

4.4 Describe the following by giving examples. (20 marks)

- a. Constitutional isomers
- b. Stereoisomers

4.5 Draw the structure that make following description. (10 marks)

- a. Three isomers with the formula C_8H_{18}
- b. Two isomers with the formula $C_4H_8O_2$

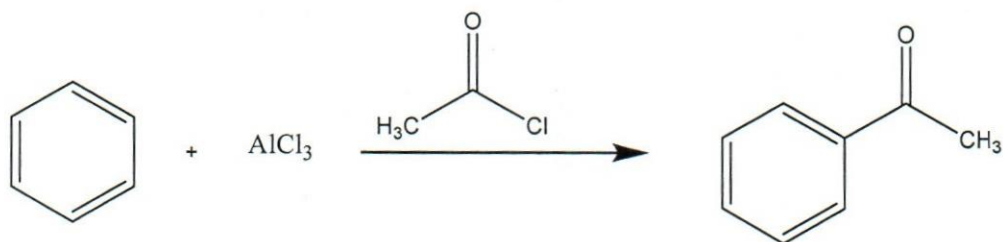
Question 05. (100 marks)

5.1. Briefly explain the reason for the following observations. (20 marks)

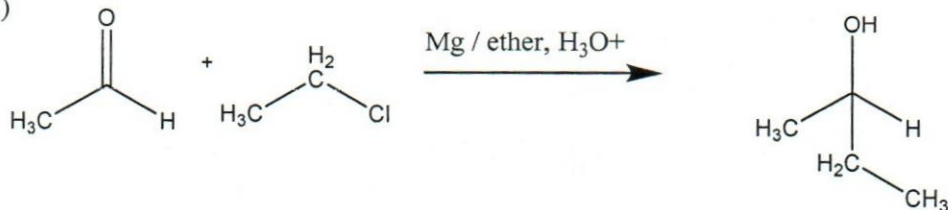
- a. Isomeric alcohols boiling points follow the order:
Primary alcohol > Secondary alcohol > tertiary alcohol.
- b. Solubility of ethers in water decreases from lower members to higher members.

5.2. Propose a reaction mechanism to account for the following reactions. (40 marks)

(a)



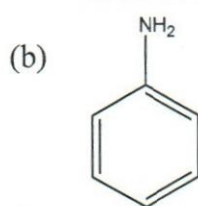
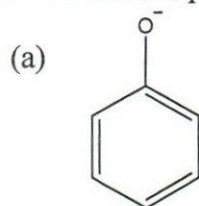
(b)



5.3. Identify the following groups and categories in to *o,p*-directors or *m*-directors. (10 marks)

- (a) $-OH$
- (b) $-NH_2$
- (c) $-COOH$
- (d) $-NO_2$
- (e) $-CN$

5.4. Draw the possible resonance structure of the following organic molecules. (20 marks)



5.5. Write the mechanism of dehydration of ethanol which leads to the formation of ethene. (10 marks)

Question 06 (100 marks)

6.1 Predict the result of the addition of hydrogen iodine to 2-methylbut-2-ene (20 marks)

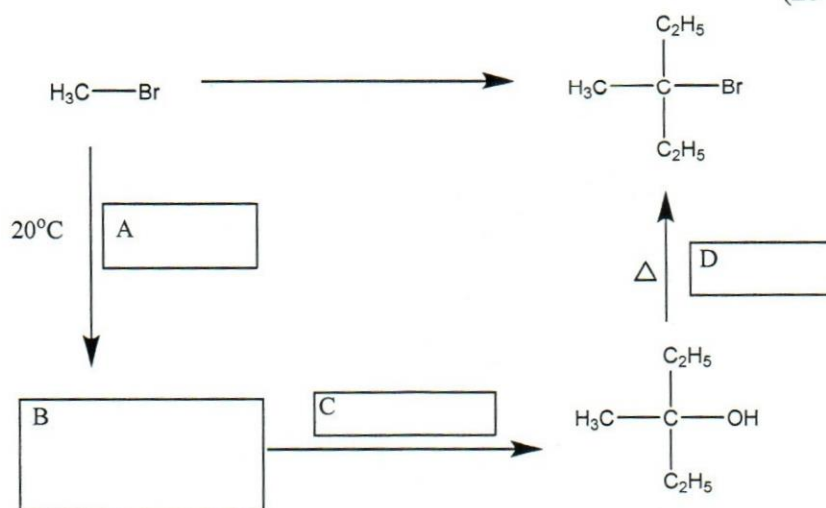
6.2 Write the mechanism for the treatment of an but-2-ene with bromine (Br₂) in a chlorinated solvent (CHCl₃). (20 marks)

6.3 Suggest a method to differentiate CH₃(CH)CH₃OH and CH₃CH₂OH organic molecule. (10 marks)

6.4 State the reaction conditions for following conversions. (25 marks)

- CH₂=CH₂ → CH₃—CH₃
- CH≡CH → CH₃—CH₃
- (CH₃)₂C=O → (CH₃)₂CH—OH
- CH₃CH₂OH → CH₃-COOH
- (CH₃)₂C=O → CH₃-CH₂-CH₃

6.5 Complete the following reaction scheme by identifying missing reagents and intermediates. (25 marks)





Faculty of Health Sciences
Bachelor of Science Honours in Industrial Pharmaceutical Sciences
IPS 2133 – Physical Pharmacy
Batch 04
2nd year 1st semester
Semester End Examination - SEQ

INDEX NUMBER:

Date : 22nd April 2022
Time : 9.00 a.m. to 11.00 a.m. (Two hours)

INSTRUCTIONS TO CANDIDATES

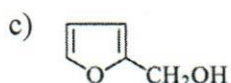
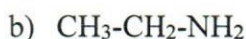
- This question paper consists of **FOUR** questions.
- Answer all questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.
- You are allowed to use non-programmable calculators

MATERIALS REQUIRED

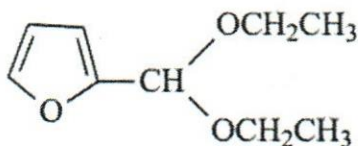
- You may use a scientific calculator. This must not be programmable and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the examinations.

Question 01**(100 marks)**

- 1.1. State 5 physical properties of drug molecules. (15 marks)
- 1.2. What are the applications of refractive index? (20 marks)
- 1.3. Calculate the molar refractive index of following organic molecules. Rm values [H(1.1), C(2.42), C=C(1.73), O(ether, ester)(1.64), C=O(2.21), N (primary aliphatic amine) (2.32)] (30 marks)



- 1.4. Calculate the density of 2-Furaldehyde diethylacetal (refractive index $n_D^{20} = 1.4440$) Rm values [H(1.1), C(2.42), C=C(1.73), O(ether, ester)(1.64), C=O(2.21), N (primary aliphatic amine) (2.32)] (35 marks)



2-Furaldehyde diethylacetal

Question 02**(100 marks)**

- 2.1 Briefly describe characteristics of a true solution. (15 marks)
- 2.2 Compare and contrast the ideal and real solutions by giving examples. (20 marks)
- 2.3 Portion of 34.2 g of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) was dissolved in water (180 g) to make 214.2 g of sugar syrup BP to prepare an elixir. Calculate molality and mole fraction of sugar in the syrup. (C=12 g/mol, H=1 g/mol, O=16g/mol) (30 marks)
- 2.4 State the colligative properties of a solution. (15 marks)
- 2.5 Calculate the freezing point depression of a solution containing 3.42 g of sucrose and 500 g of water. Molar mass of sucrose = 342g/mol, $K_f = 1.86$ (20 marks)

Question 03**(100 marks)**

- 3.1 Compare the hypertonic, isotonic and hypotonic solutions with examples. (15 marks)
- 3.2 Calculate the required amount of water to make 0.3 g procaine hydrochloride isotonic with body fluid, using the white Vincent method. Suppose that solution is 30 ml of a 1% solution of amphetamine sulphate. $E = 0.21$ (20 marks)
- 3.3 Briefly describe how particles size of a solid affect on the solubility in liquids. (15 marks)
- 3.4 The densities of ice and water are 0.9168 and 0.998 g cm^{-3} respectively under one standard atmospheric pressure at 0°C .
- 3.1.1 Calculate the difference between ΔH and ΔU for the fusion (solid ice turning into liquid water) of 1 mole of ice under the given conditions. (20 marks)
- 3.4.2 Calculate the Helmholtz free energy change, ΔA (10 marks)
- 3.4.3 Calculate the work done by the system where 1 mole of ice is fused. (10 marks)
- 3.4.4 If the heat change accompanying the fusion is 6.05 kJ mol^{-1} , calculate the enthalpy change, ΔH for the fusion process. (10 marks)

Question 04**(100 marks)**

- 4.1 State the difference between dipole-dipole interaction and ion-dipole interaction by giving examples. (20 marks)
- 4.2 Briefly describe crystalline state. (10 marks)
- 4.3 Consider water as the system with a liquid-solid curve. Determine the degree of freedom of the above system. (20 marks)
- 4.4 Briefly describe the types of thermodynamic systems. (20 marks)
- 4.5 Ammonium nitrate dissolves in water at 20°C with an enthalpy change (ΔH) of $+45.2 \text{ kJ mol}^{-1}$. The entropy change for the dissolution is $+185.2 \text{ JK}^{-1} \text{ mol}^{-1}$. **Calculate** the value of ΔG at 20°C and **deduce** that ammonium nitrate will spontaneously dissolve in the water at 20°C although it is an endothermic process. (30 marks)



CINEC Campus (Pvt) Ltd

Approved for Quality Management System

Faculty of Health Sciences

Bachelor of Science Honours in Industrial Pharmaceutical Sciences

IPS 2143 Organic Chemistry

Batch 04

2nd year 1st semester

End Semester SEQ Examination

INDEX NUMBER:

Date: 25th of April 2022

Time: 09.00 am – 12.00 pm - Three Hours

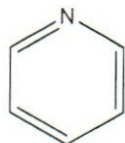
INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

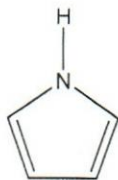
Question 01

(100 marks)

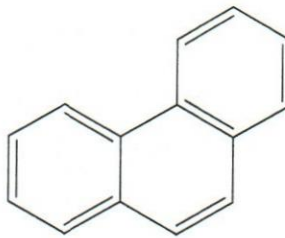
- 1.1 List the criteria required for a compound to be considered aromatic. (20 marks)
- 1.2 Indicate the following compounds are aromatic, anti-aromatic/non-aromatic. (20 marks)



A



B

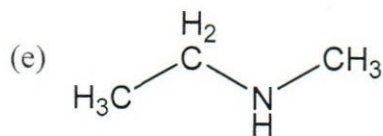
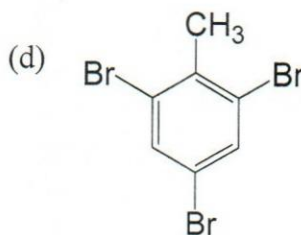
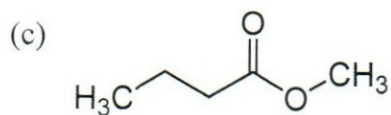
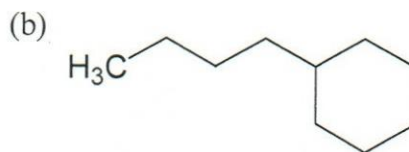
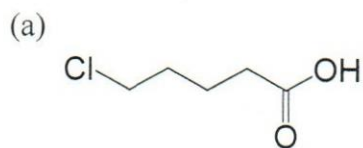


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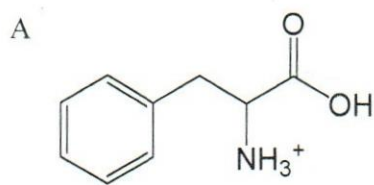
D

- 1.3 Name the following structures in IUPAC nomenclature. (25 marks)



- 1.4. Draw the structures corresponding to the following IUPAC names. (25 marks)
- (a) 3-(N-methylamino)butanoic acid
- (b) 3-methyl-2-phenyloctane
- (c) 2,4,6-Trinitrotoluene
- (d) 3-hydroxyprop-2-enal
- (e) 2-methylheptan-3-one

1.5. Consider the following molecules and select the stronger acid (10 marks)



1.83

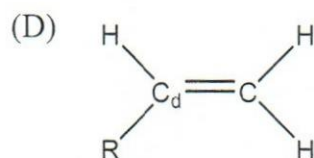
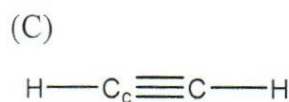
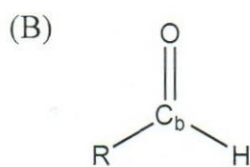
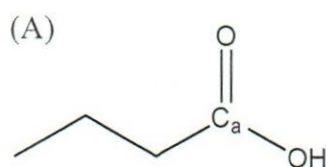


2.83

Question 02

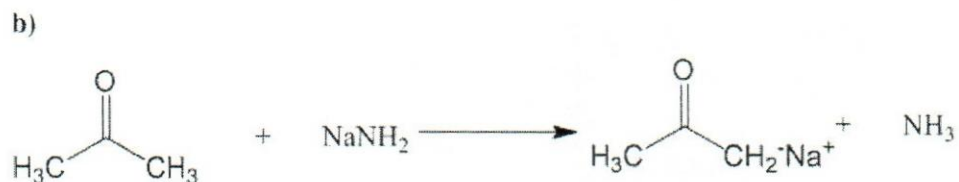
(100 marks)

2.1. Determine the oxidation states on the carbon atoms (C_a , C_b , C_c , C_d) of following organic molecules. (10 marks)



2.2. Comment on the direction of the following reactions. (30 marks)

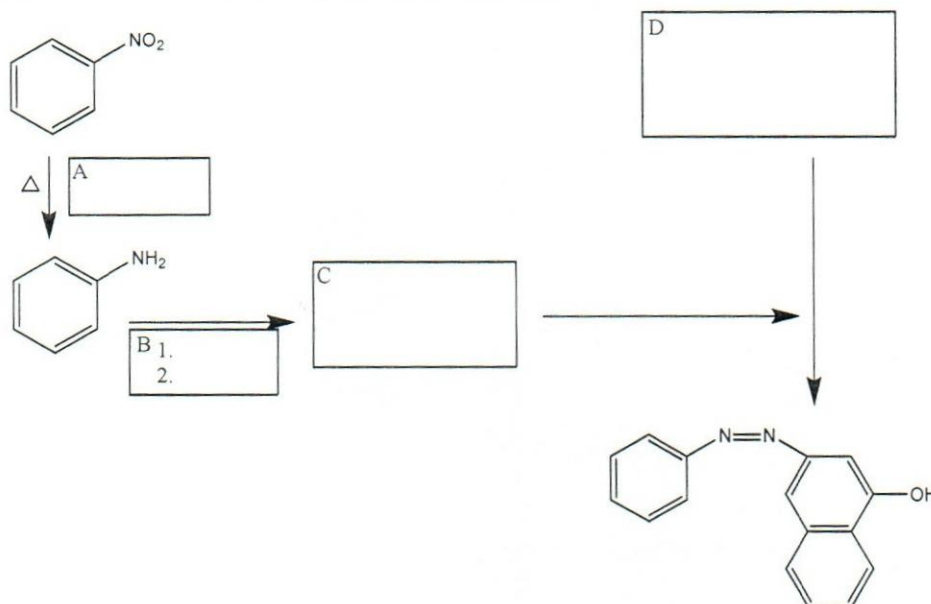
(pK_a for HCN (+9.2), CH_3CO_2H (+4.8), 2-propanone (+22), NH_3 (+35))



2.3. Classify each of the following reactions as an addition, elimination, substitution, or rearrangement. (10 marks)

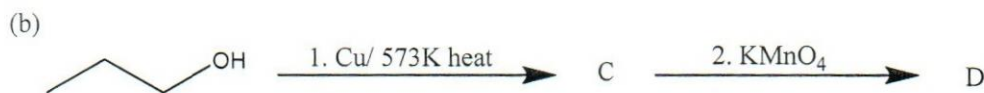


2.4. Predict the structure of (A), (B), (C), (D) and (E) (50 marks)



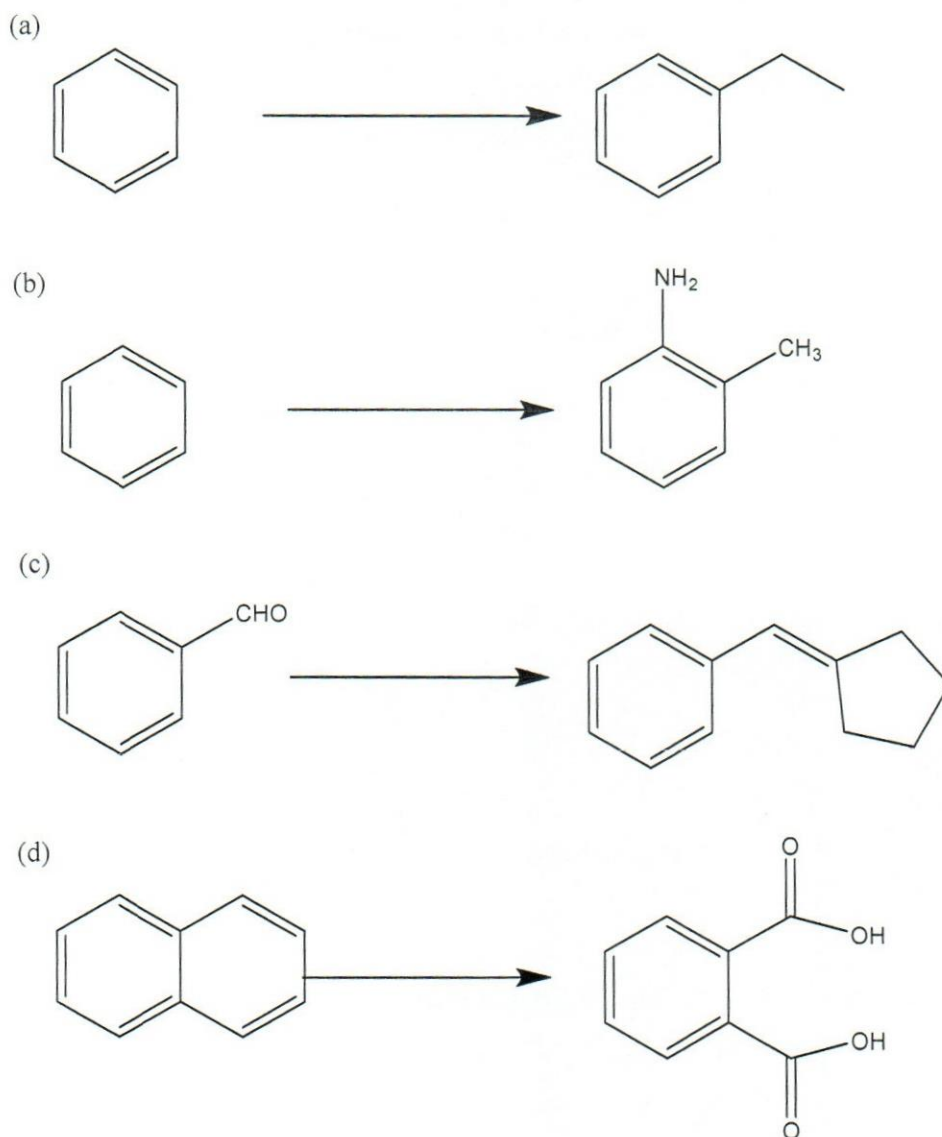
Question 03 (100 marks)

3.1 Write the products (A to F) of the following reactions. (30 marks)



3.2 How would you synthesis the following organic compounds using any other reagents?

(50 marks)



3.3 Compare and contrast the water solubility of following organic molecules by giving reasons.

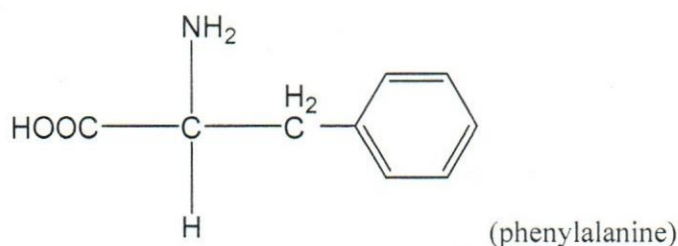
(20 marks)

(a) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3CHO

(b) $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{CH}_3\text{CH}_2\text{F}$

Question 04**(100 marks)**

- 4.1. Draw the 3-dimensional structure (lines, wedge and dash-wedges diagram) of two enantiomers of the given amino acid (phenylalanine) and assign absolute configuration (R/S configuration) of each enantiomer. (20 marks)

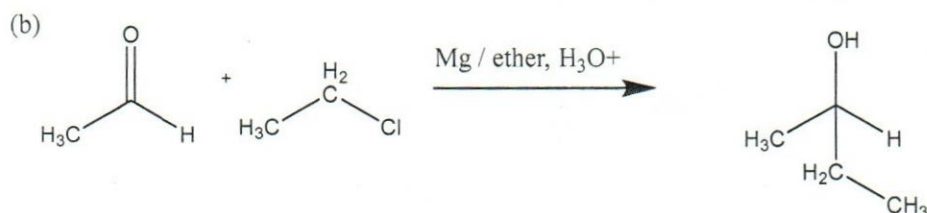
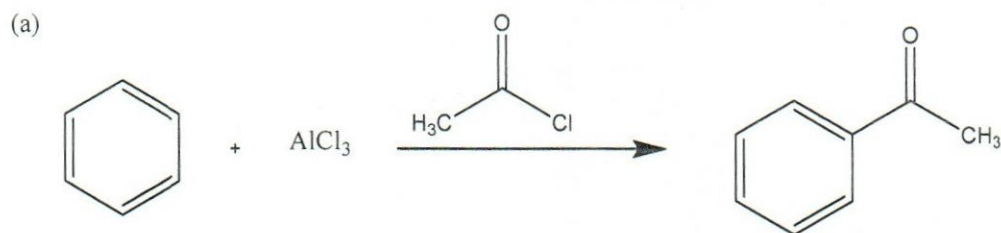


- 4.2. Draw the Newman projection of staggered and eclipsed conformations of the following molecules. (20 marks)
- (a) $\text{Cl-CH}_2\text{-CH}_2\text{-Cl}$
- (b) $\text{OH-CH}_2\text{-CH}_2\text{-CH}_3$
- 4.3. Draw compounds that contain the following. (20 marks)
- A primary alcohol
 - A tertiary amine
 - Both primary and secondary alcohol
 - Quaternary carbon
- 4.4. Describe the following by giving examples. (30 marks)
- Constitutional isomers
 - Stereoisomers
- 4.5. Draw the structure that make following description. (10 marks)
- Three isomers with the formula C_8H_{18}
 - Two isomers with the formula $\text{C}_4\text{H}_8\text{O}_2$

Question 05**(100 marks)**

- 5.1. Briefly explain the reason for the following observations. (20 marks)
- 5.1.1. Isomeric alcohols boiling points follow the order:
Primary alcohol > Secondary alcohol > tertiary alcohol.
 - 5.1.2. Solubility of ethers in water decreases from lower members to higher members.

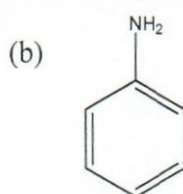
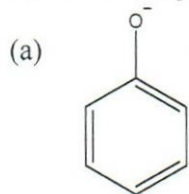
5.2. Propose a reaction mechanism to account for the following reactions. (30 marks)



5.3. Identify the following groups and categories in to *o,p*-directors or *m*-directors. (10 marks)

- (a) $-\text{OH}$
- (b) $-\text{NH}_2$
- (c) $-\text{COOH}$
- (d) $-\text{NO}_2$
- (e) $-\text{CN}$

5.4. Draw the possible resonance structure of the following organic molecules. (10 marks)



5.5. Write the mechanism of dehydration of ethanol which leads to the formation of ethene. (30 marks)

Question 06 (100 marks)

6.1 Predict the result of the addition of hydrogen iodine to 2-methylbut-2-ene (20 marks)

6.2 Write the mechanism for the treatment of an but-2-ene with bromine (Br_2) in a chlorinated solvent (CHCl_3). (20 marks)

6.3 Suggest a method to differentiate $(\text{CH}_3)_2\text{CHOH}$ and $\text{CH}_3\text{CH}_2\text{OH}$ organic molecule. (10 marks)

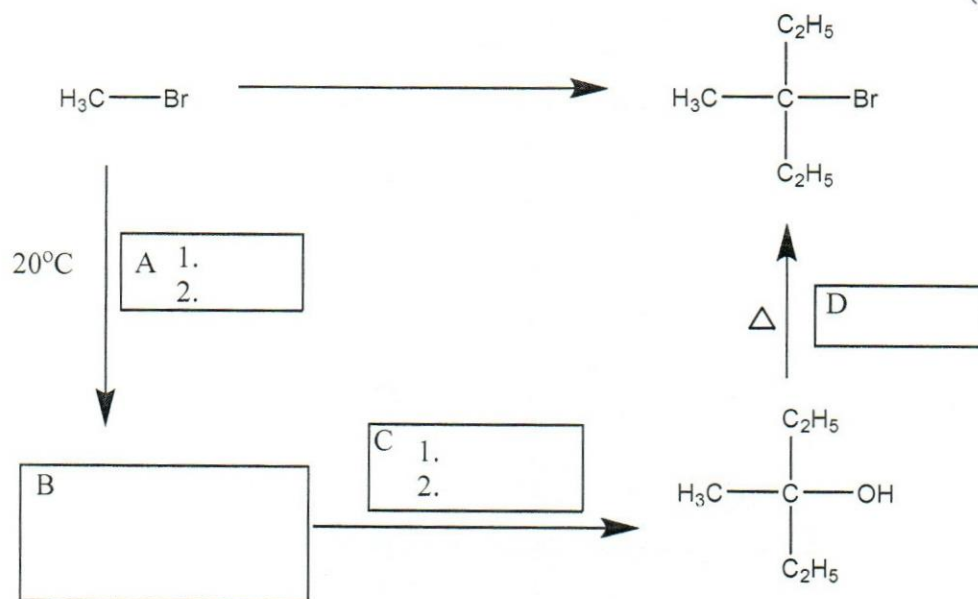
6.4 State the reaction conditions for following conversions.

(25 marks)

- $\text{CH}_2=\text{CH}_2 \rightarrow \text{CH}_3-\text{CH}_3$
- $\text{CH}\equiv\text{CH} \rightarrow \text{CH}_3-\text{CH}_3$
- $(\text{CH}_3)_2\text{C}=\text{O} \rightarrow (\text{CH}_3)_2\text{CH}-\text{OH}$
- $\text{CH}_3\text{CH}_2\text{OH} \rightarrow \text{CH}_3-\text{COOH}$
- $(\text{CH}_3)_2\text{C}=\text{O} \rightarrow \text{CH}_3-\text{CH}_2-\text{CH}_3$

6.5 Complete the following reaction scheme by identifying missing reagents and intermediates.

(25 marks)





CINEC Campus (Pvt) Ltd

Approved for Quality Management System

Faculty of Health Sciences

Bachelor of Science Honours in Industrial Pharmaceutical Science

IPS 2143 Organic Chemistry

Batch 02 & 03

2nd year 1st semester

End Semester SEQ Examination

INDEX NUMBER:

Date: 11th August 2021

Time: 09.00 am – 12.00 pm - Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

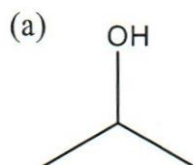
QUESTION 01**(100 marks)**

1.1. 1.1. The cis isomer of alkene $\text{CH}_3\text{CH}=\text{CHCH}_3$, is less stable than its' trans isomer. Comment on this statement. Illustrate your answer by drawing the cis and trans isomers of the mentioned organic compound. (25 marks)

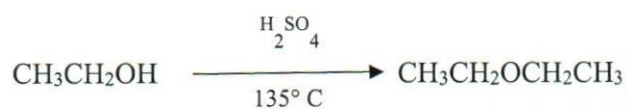
1.2. Write the displayed formula for following organic compounds. (10 marks)

- Cyclohexane
- Ethyl methyl ether
- 2-Methyl -2-propanol
- Acetylene

1.3. Writ the IUPAC name of following organic molecules. (10 marks)



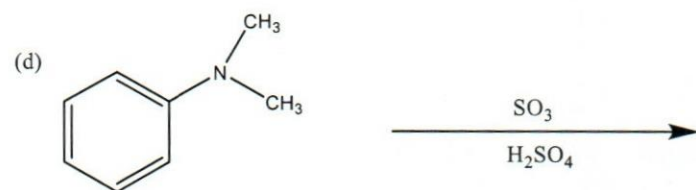
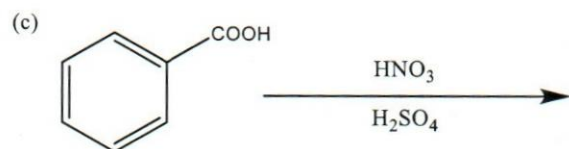
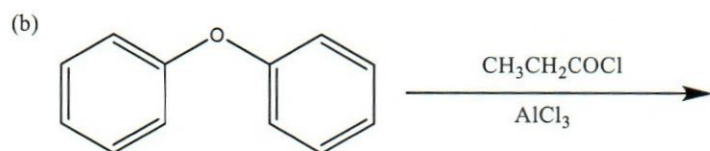
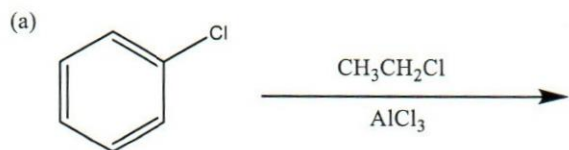
1.4. Write down the reaction mechanism for the following chemical reaction. (25 marks)



1.5. Write down the reaction in stepwise for the formation of $(\text{CH}_3\text{CH}_2)_2\text{CuLi}$ with the presence of $\text{CH}_3\text{CH}_2\text{Br}$ and Li following the addition of CuI. (30 marks)

QUESTION 02**(100 marks)**

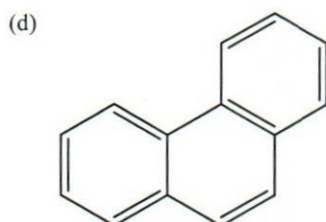
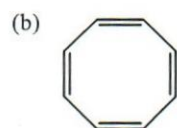
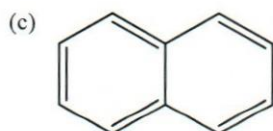
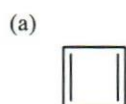
2.1. Predict the end products of following reactions.

(20 marks)

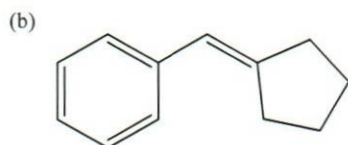
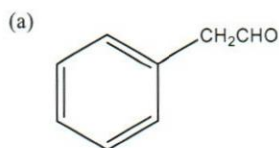
2.2. List the criteria required for a compound to be aromatic.

(10 marks)

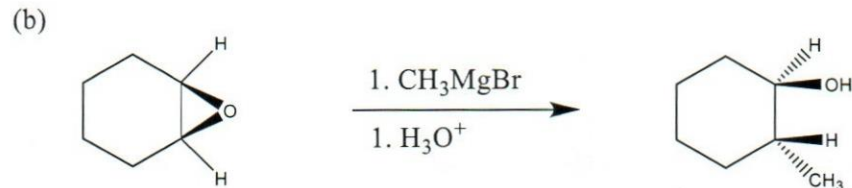
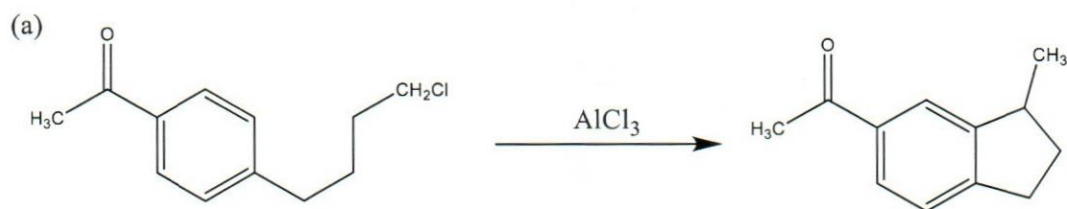
2.3. Indicate whether the following compounds are aromatic, anti-aromatic or non-aromatic.

(10 marks)

2.4. How would you synthesis the following substances from benzaldehyde using any other reagents. (20 marks)



2.5. Propose a reaction mechanism to account for the following reactions. (40 marks)



QUESTION 03

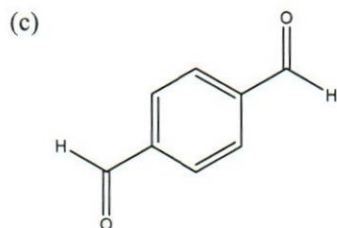
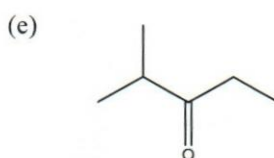
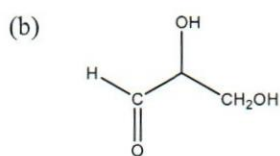
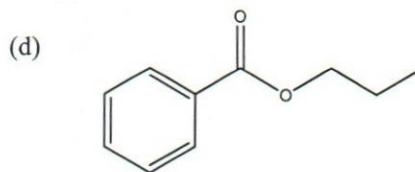
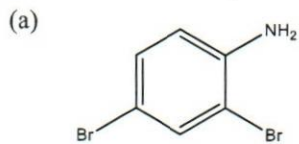
(100 marks)

3.1. Draw the structures corresponding to the following IUPAC names. (25 marks)

- 3-(N,N-Dimethylamino)propanoic acid
- 3-methyl-2-phenylhexane
- 2,4,6-Trinitrophenol (picric acid)
- 3-phenylprop-2-enal
- 2-methylheptan-3-one

3.2. Name the following compounds.

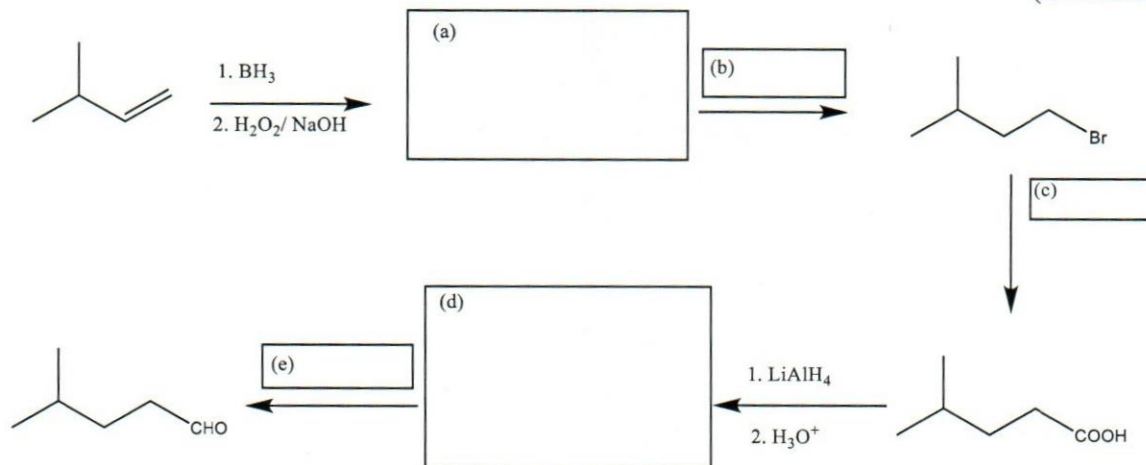
(25 marks)



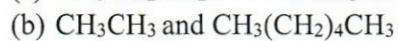
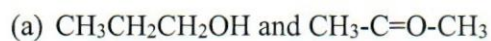
3.3. Identify the following groups and categories in to *o,p*-directors or *m*-directors. (10 marks)

(a) -OH, (b) -COOH, (c) -NH₂, (d) -CH₃, (e) -OCH₂CH₃

3.4. Identify the missing intermediates (a, d) and reagents (b, c, e) in the following reaction scheme. (20 marks)



3.5. Compare and contrast the water solubility of following organic molecules by giving reasons
(20 marks)



QUESTION 04

(100 marks)

4.1. How would you synthesis the following reactions.

(40 marks)

(a)



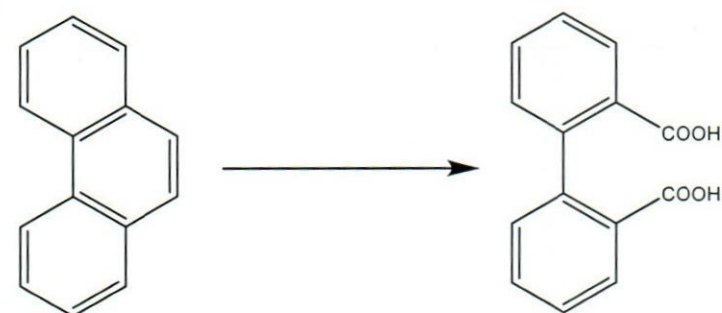
(b)



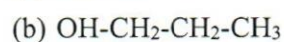
(c)



(d)



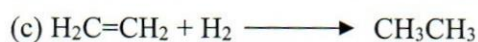
4.2. Draw the Newman projection of staggered and eclipsed conformations of the following molecules.
(10 marks)



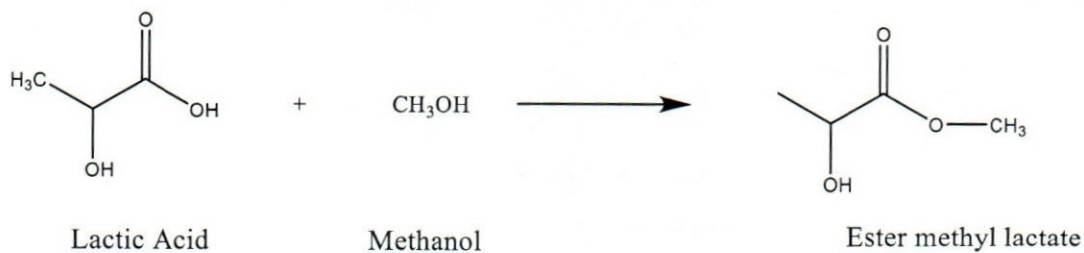
4.3. Comment on the possibility of occurring the following reactions. (20 marks)
 Pka values - water: (15.74), acetylene: (25), Acetone: (19), NH₃: (36)



4.4. Classify each of the following reactions as an addition, elimination, substitution, or rearrangement. (10 marks)

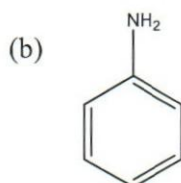
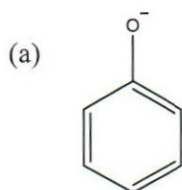


4.5 Supposed that lactic acid reacts with CH₃OH to form ester methyl lactate. Draw the 3-dimensional structure (lines and dash wedges) of two enantiomers of ester methyl lactate and assign absolute configuration (R/S system) of each enantiomer. (20 marks)

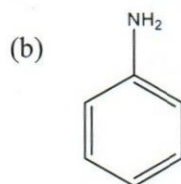
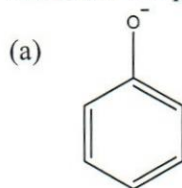


QUESTION 05**(100 marks)**

5.1. Consider the following drug molecules

5.1.1. How many sp^3 -hybridized carbons are found in each molecule? (10 marks)5.1.2. How many sp^2 -hybridized carbons are found in each molecule? (10 marks)

5.2. Draw the possible resonance structure of the following organic molecules. (20 marks)



5.3. Draw compounds that contain the following. (20 marks)

- A primary alcohol
- A tertiary amine
- Both primary and secondary alcohol
- Quaternary carbon

5.4. Describe the following by giving examples. (30 marks)

- Constitutional isomers
- Stereoisomers

5.5. Draw the structure that make following description. (10 marks)

- Three isomers with the formula C_8H_{18}
- Two isomers with the formula $C_4H_8O_2$

QUESTION 06**(100 marks)**6.1. State **02** (Two) possible reasons for existing isomers of an alcohol.

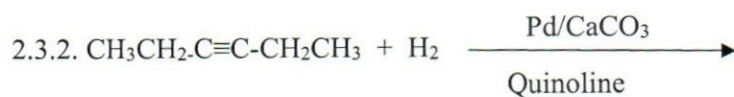
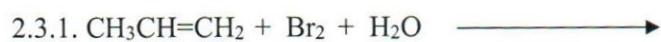
(10 marks)

6.2. $(\text{CH}_3)_3\text{C}^+$ is more stable than $\text{CH}_3\text{H}_2\text{C}^+$. Justify this statement.

(15 marks)

6.3. Draw the major products of following chemical reactions.

(15 marks)



6.4. Write down the reaction mechanism for following chemical reaction.

(20 marks)



6.5. Outline the chain reaction for methane chlorination.

(40 marks)



Faculty of Health Sciences
Bachelor of Science Honours in Industrial Pharmaceutical Sciences
IPS 2133 – Physical Pharmacy
Batch 02 403
2nd year 1st semester
Semester End Examination - SEQ

INDEX NUMBER:

Date : 12th August 2021
Time : 9.00 a.m. to 11.00 a.m.

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer all questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.
- You are allowed to use non-programmable calculators

Question 01**(100 marks)**

- 1.1. Briefly describe the pharmaceutical dispersions. (15 marks)
- 1.2. Briefly describe how does a solution form. (15 marks)
- 1.3. Aqueous solution of FeSO_4 was prepared by adding 41.5 g of FeSO_4 to distilled water to make 1000 ml. the density of the solution is 1.0375 and molecular weight 151.9 g/mol. Calculate the molarity, molality, mole fraction of FeSO_4 and the w/w percentage of FeSO_4 . (40 marks)
- 1.4. Compare and contrast the ideal and real solutions by giving examples. (20 marks)
- 1.5. State the colligative properties of a solution. (10 marks)

Question 02**(100 marks)**

- 2.1. Briefly describe the electrolytic and non-electrolytic solutions. (15 marks)
- 2.2. Calculate the freezing point depression of a solution containing 3.42 g of sucrose and 500 g of water. $M_{\text{sucrose}} = 342\text{g/mol}$, $K_f = 1.86$ (15 marks)
- 2.3. Describe the tonicity, hypertonic, isotonic and hypotonic solutions with examples. (30 marks)
- 2.4. Calculate the required amount of water to make 0.15 g Amphetamine sulphate isotonic with body fluid, using the white Vincent method. Suppose that solution is 15 ml of a 1% solution of amphetamine sulphate. $E = 0.22$ (20 marks)
- 2.5. State 5 factors that affect the solubility of solids in liquids. (10 marks)
- 2.6. Briefly describe the effect of temperature on the solubility of solids in liquids. (10 marks)

Question 03**(100 marks)**

- 3.1. What is induced polarization? (10 Marks)
- 3.2. Write three applications of Refractive Index (RI) and Abbe's refractometer. (15 marks)
- 3.3. The molar refraction of the compound $\text{C}_2\text{H}_5\text{—CO—CH}_3$ is 19.998 while for the compound $\text{CH}_3\text{—CH=CH—CH}_2\text{—OH}$ it is 18.7. Discuss the reasons for this difference in the molar refraction. (25 marks)
- 3.4. Compare and contrast the ion-ion forces and van der Waals forces. (30 marks)
- 3.5. A system absorbs 300 kJ of heat and does 650 J of work on the surroundings. Calculate the internal energy change of this system. (20 marks)

Question 04

(100 marks)

- 4.1. State the difference between intramolecular and intermolecular forces. (20 marks)
- 4.2. State how amorphous solids differ from crystalline solids. (20 marks)
- 4.3. Briefly describe polymorphism by giving examples. (20 marks)
- 4.4. Briefly describe the types of thermodynamic systems. (20 marks)
- 4.5. Calculate the molar mass of a gas if 0.281 g of the gas occupies a volume of 125 mL at a temperature 126 °C and a pressure of 777 torr. (760 torr = 1 atm) (20 marks)



Faculty of Health Sciences
Bachelor of Science Honours in Industrial Pharmaceutical Sciences
BCS 2133 – Physical Pharmacy
Batch - 01
2nd year 1st semester
End Semester SEQ Examination

INDEX NUMBER:

Date : 4th September 2020
Time : 09.00 am – 11.00 am (Two Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.
- You are allowed to use calculators

QUESTION 01**(100 marks)**

- 1.1. Define 'Polymorphism'. (15 marks)
- 1.2. What is the polymorphic form that is used in formulating medicines?
Give reasons for your answer. (15 marks)
- 1.3. Arrange the intermolecular forces from the strongest to the weakest. (20 marks)
- 1.4. List out the differences between crystalline solids and amorphous solids (25 marks)
- 1.5. A 20.83 g sample of a gas occupies 4.167 L at 79.97 kPa at 30.0 °C.
What is its molecular weight?
(1 atm = 101.325 kPa, Universal gas constant = 0.08206 L.atm.mol⁻¹K⁻¹) (25 marks)

QUESTION 02**(100 marks)**

- 2.1. What is a solution? (15 marks)
- 2.2. Sodium chloride 10g in 1000 g of water. Calculate the molality and molarity.
(Assume the molecular weight of sodium chloride is 23 g/mol and volume of the solution is equal to the solvent and density is 0.9997 g/ml). (25 marks)
- 2.3. Calculate the mole fraction of HCl in a solution of hydrochloric acid in water containing 36% HCl by weight. (10 marks)
- 2.4. State four colligative properties of a non-electrolytic solution. (10 marks)
- 2.5. Compare and contrast the difference between electrolytic solution and non-electrolytic solution. (20 marks)
- 2.6. Describe the importance of particle size of a solid dosage form to solubilize in biological fluids. (20 marks)

QUESTION 03

(100 marks)

3.1. State the first law of thermodynamics. (15 marks)

3.2. What is the difference between intermolecular forces and intramolecular forces? (15 marks)

3.3. In an exothermic process, the volume of a gas expanded from 186 mL to 1997 mL against a constant pressure of 745 torr. During the process, 18.6 calories of heat energy were given off. What was the internal energy change for the system in joules?
Also, (1 L.atm = 101.3 J, 1 cal = 4.184 J, 760 torr = 1 atm). (25 marks)

3.4. Briefly define the following terms. (20 marks)

- a) Plane polarized light
- b) Optical Activity
- c) Dextrorotatory Substances
- d) Levorotatory Substances

3.5. A sample containing a single enantiomer of fluoxetine is placed in a polarimeter. The observed rotation is 9.06° clockwise. The sample was made by dissolving 1.24 g of fluoxetine in a solution with a total volume of 2.62 mL. The light source was a sodium D line and the temperature was 25°C . The length of the sample tube was 1.25 dm.
Calculate the specific rotation of the sample.

(25 marks)

QUESTION 04

(100 marks)

- 4.1. State the difference between class I methods and class II methods of tonicity adjustment (20 marks)
- 4.2. Calculate the gram of sodium chloride required to make 30 ml of a 1% pilocarpine nitrate solution using sodium chloride equivalent method. (For pilocarpine nitrate, $E = 0.23$) (30 marks)
- 4.3. What are the importance of diffusion in pharmaceutical sciences? (20 marks)
- 4.4. Olanzapine hydrochloride is a weakly acidic second-generation antipsychotic drug ($pK_a = 7.3$). Assume the pH of the stomach is 2 and the small intestinal pH is 6.
- a) Where the drug is dissolved? (10 marks)
- b) Give the reason for the drug dissolution at the location given in answer (a) (20 marks)



CINE Campus (Pvt) Ltd

Approved for Quality Management System

Faculty of Health Sciences

Bachelor of Science Honours in Industrial Pharmaceutical Sciences

IPS 2143 Organic Chemistry

Batch 01

2nd year 1st semester

End Semester Practical Examination

INDEX NUMBER:

.....

Date: 9th September 2020

Time: 09.00 am – 11.00 pm - Two Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

QUESTION 1

(100 marks)

1.1 Give the IUPAC names of the following compounds.

(40 marks)



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.....



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1.2 Draw the structures of the following compounds.

(40 marks)



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1.2.3 ethoxybutane

.....
.....
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1.2.4 ethylcyclohexane

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1.3 Write down the necessary reagents and reaction conditions for the following reactions.

(20 marks)



QUESTION 2

(100 marks)

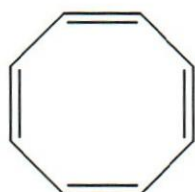
2.1 List the criteria required for a compound to be considered as aromatic.

(20 marks)

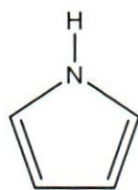
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2.2 Indicate whether the following compounds are aromatic, anti-aromatic/non-aromatic.

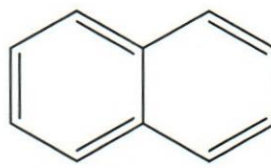
(20 marks)



A



B



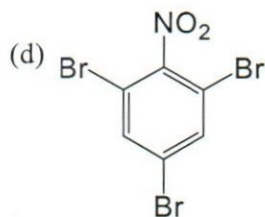
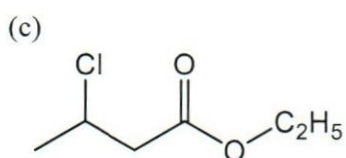
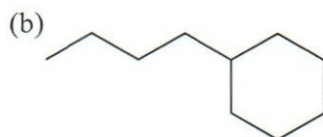
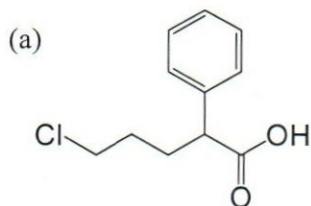
C



D

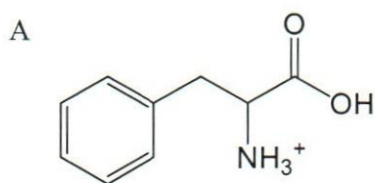
- A.
 B.
 C.
 D.

2.3 Name the following structures according to the IUPAC nomenclature. (20 marks)

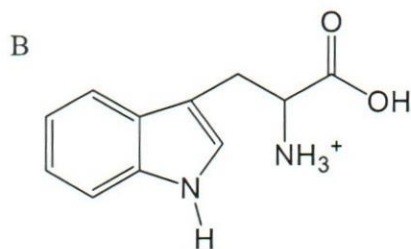


- a.
 b.
 c.
 d.

2.4 Considering following molecules, select the strongest acid. (10 marks)



pKa - 1.83



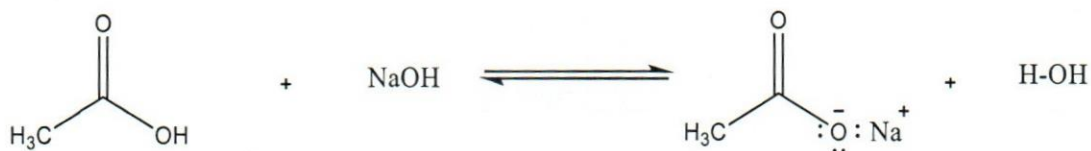
pKa - 2.83

.....

2.5 Comment on the possibilities of occurring the following reactions. (30 marks)

(pKa for CH₃CO₂H – 4.8, H₂O – 15.7, NH₃ - 35)

(a)



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.....

.....

(b)



.....

.....

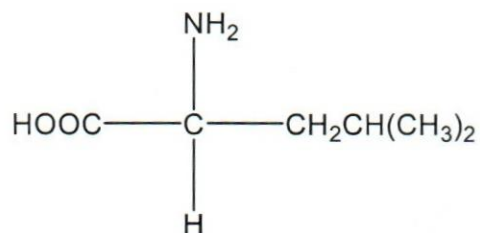
.....

.....

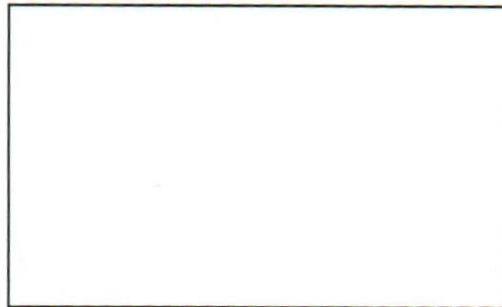
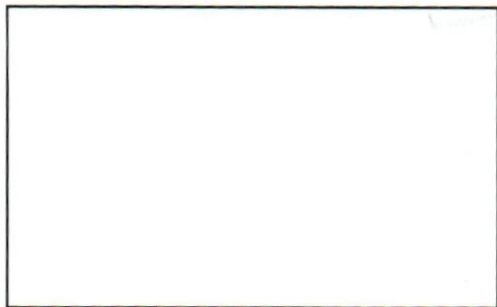
QUESTION 3

(100 marks)

3.1 Draw the 3-dimensional structure (lines, wedge and dash-wedges diagram) of two enantiomers of the given amino acid (leucine) and assign absolute configuration (R/S configuration) of each enantiomer. (20 marks)



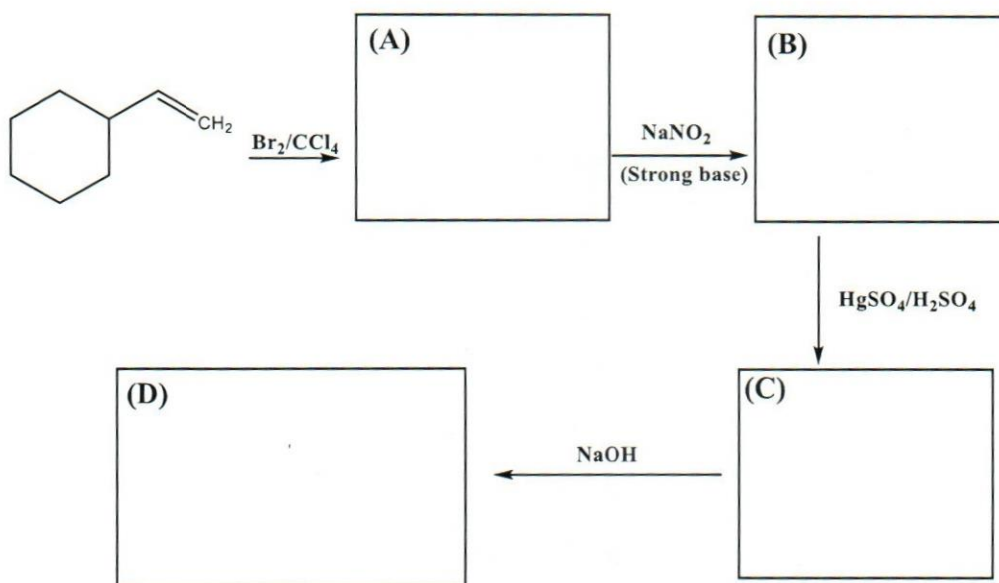
(Leucine)



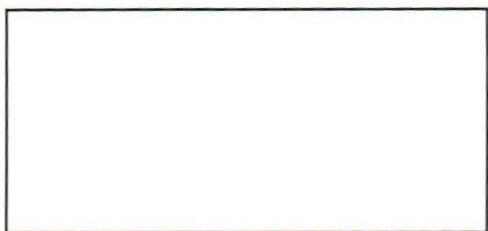
3.2

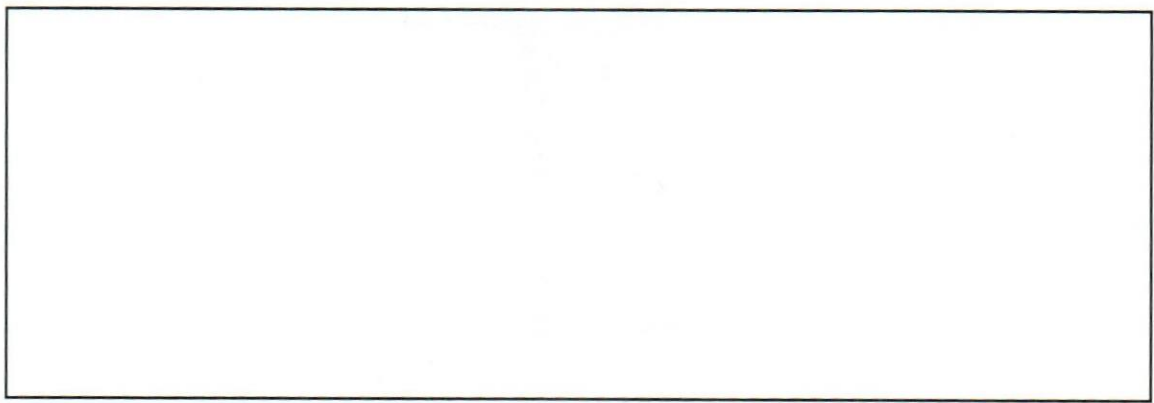
3.2.1. Predict the structure of (A), (B), (C) and (D) in the following chemical reaction.

(50 marks)



3.2.2. Give the structure of the compound (C) that is subjected to the reaction with ylide ($\text{Ph}_3\text{P}=\text{CH}_2-\text{CH}_3$) and write down the reaction mechanism. (30 marks)



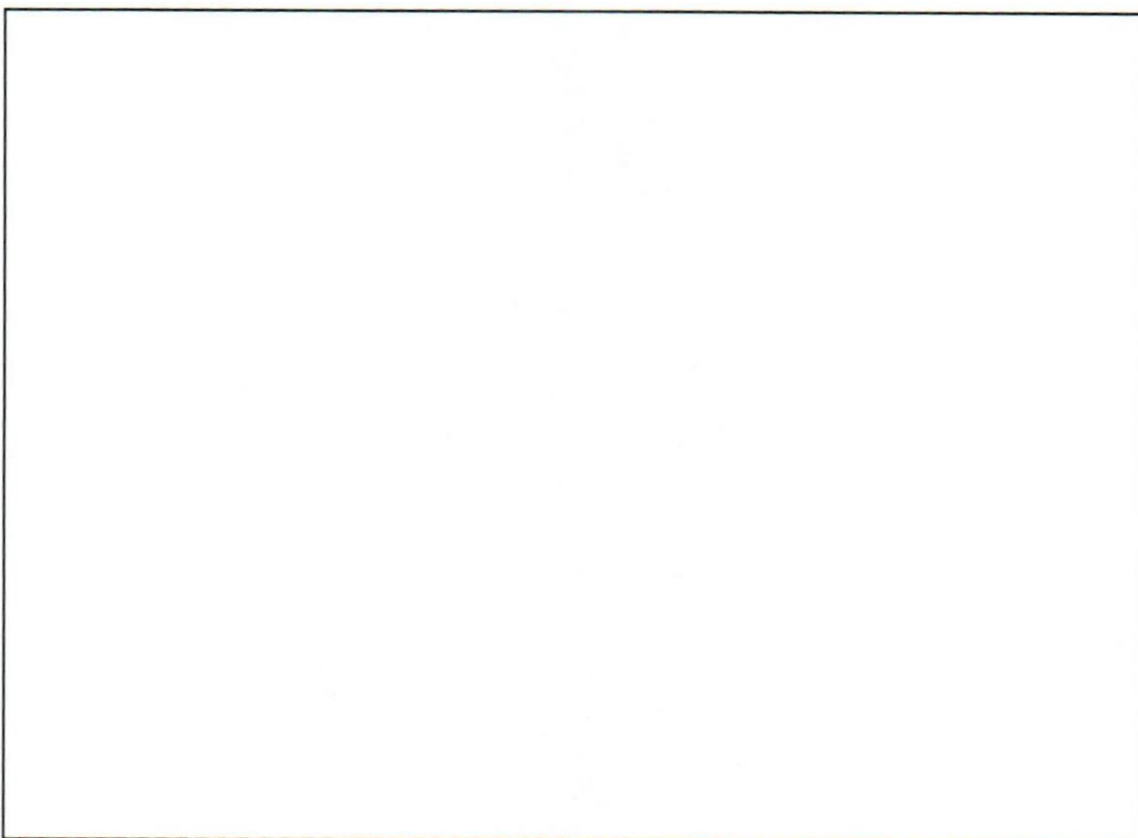
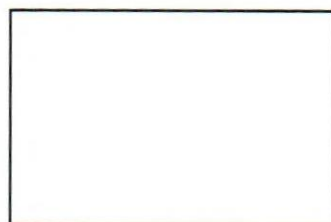
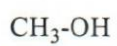
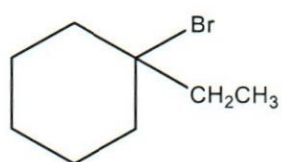


QUESTION 4

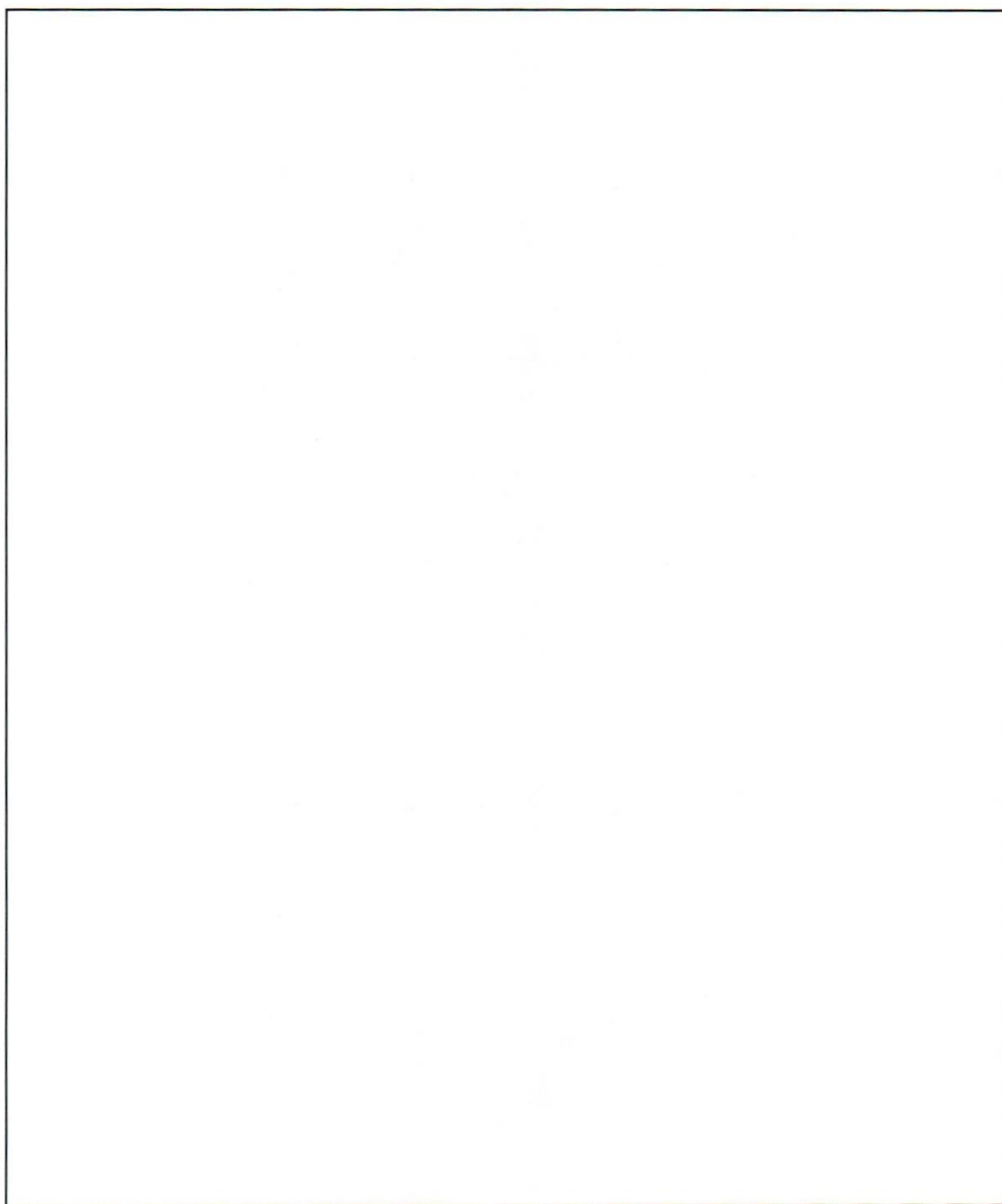
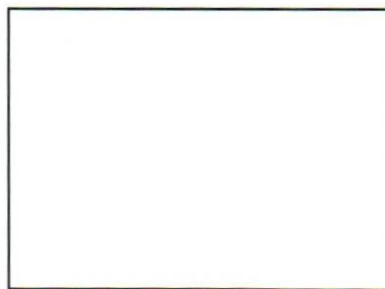
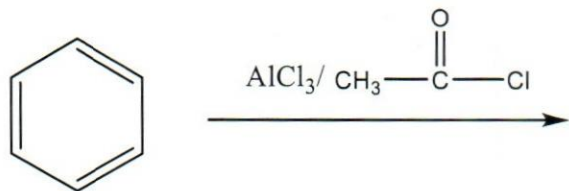
(100 marks)

4.1 Write the product and the mechanism of the following chemical reaction. (50 marks)

(a)



(b)



4.2 Write down the necessary reagents and reaction conditions for the following reactions
(30 marks)

(a)



(b)



(c)



4.3 Compare and contrast the water solubility of following organic molecules by giving reasons. (20 marks)

(a) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3CHO

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.....
.....
.....

(b) $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{CH}_3\text{CH}_2\text{F}$

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.....