Total No. of Printed Pages:02

**SUBJECT CODE NO:- R-6046**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Food, Fertilizer & Pesticides Analysis - CHEA-418**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Question no. 1 from Section A is compulsory.
2) Attempt any five questions from Section B.
3) Figures to the right indicate full marks.
4) Use single answer book for Section A and B.

Section A

Q.1 Attempt the following:- 20

1) Give the classification of fertilizers.
2) How will you determine moisture from food sample?
3) Write the difference between soap and detergent.
4) Give the composition of honey.
5) Define cloud point of oils and fats.
6) What are pesticides?
7) Name some water soluble vitamins.
8) What is the biological value of protein?
9) Write the properties of detergents.
10) What are food preservatives?

Section B

Q.2 a) Explain the determination of chicory from coffee. 06
b) Give the procedure to determine saponification value of oil. 06

Q.3 a) Describe the procedure for the determination of glucose in honey. 06
b) Give the analytical technique for the determination of Ascorbic acid in Beverages. 06

Q.4 a) Describe the procedure for the estimation of Vitamin $B_{12}$. 06
b) How will you determine potassium from fertilizer? 06

Q.5 a) Explain the method to analyse crude fibres in food products. 06
b) Write a note on advantages and disadvantages of using pesticides. 06

Q.6 a) Discuss the determination of chlorides in detergents. 06
b) Define acid value and Hydroxyl value of oils. How will you determine it? 06

| | | | |
|---|---|---|---|
| Q.7 | a) | Write a note on Legislation of pesticides. | 06 |
| | b) | What is food spoilage? Write a note on maintaining the pH of food products. | 06 |
| Q.8 | a) | Write a note on deficiency of Vitamin C and Vitamin E in human beings. | 06 |
| | b) | Describe the methelene blue method for determination of active ingredient in detergent. | 06 |

R-6047

Total No. of Printed Pages:5

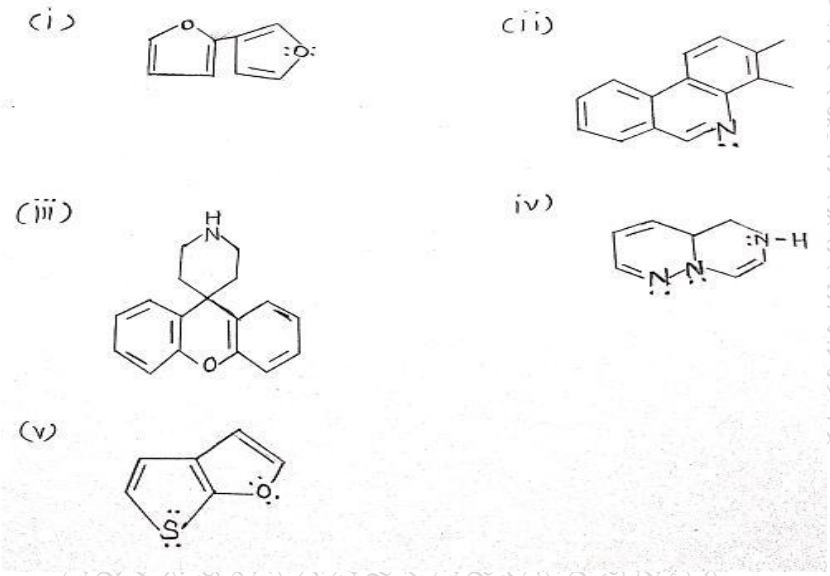
**SUBJECT CODE NO:- R-6047**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Advanced Organic and Heterocyclic Chemistry - CHEO-418**

**[Time: Three Hours]** **[Max. Marks:80]**

Please check whether you have got the right question paper.

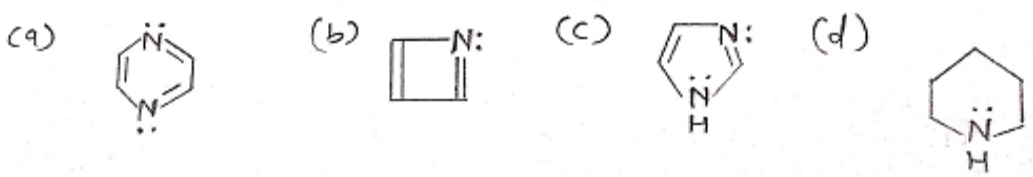
N.B i) Question number one is compulsory.
ii) Attempt any five questions from Q.2 to Q.8.

Q.1 a) Give the IUPAC nomenclature of the following compounds. 10




b) Choose an appropriate answer for the following multiple choice questions 10

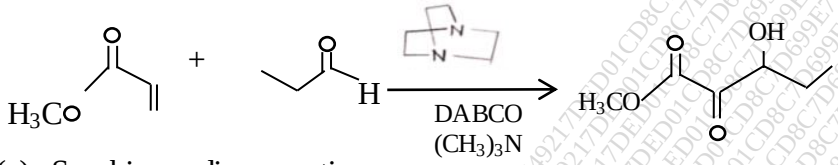
(i) Which of the following heterocyclic compound is antiaromatic




(ii) Histamine is derivatives of ……..
(a) Imidazole (b) pyrrole (c) pyridine (d) Thiophene

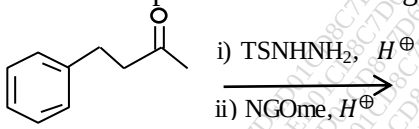
(iii) Which reagent would you use to convert 2- Pyridone to 2- Chloropyridine?
(a) $CCl_4$ (b) $Pocl_3$ (c) $Pcl_3$ (d) HCl

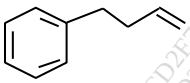
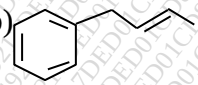
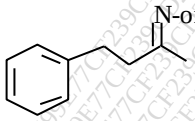
(iv) Identify the name of following reaction




(a) Suzuki coupling reaction
(b) Corey – Fuchs reaction
(c) Aldol – Tishehenko reaction
(d) Bylis – Hillaman reaction

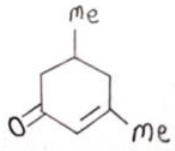
(v) Choose the product for following reaction



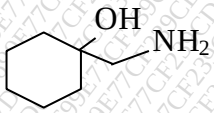

(a) 
(b) 
(c) 

(d) None of the above

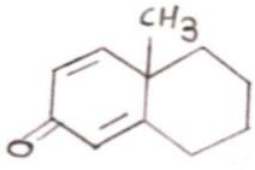
Q.2 Predict the product(s) with Mechanism 12

(i) 

i) $H_2O_2$, $\overset{\ominus}{O}H$
ii) $H_2NNHSO_2Ar, H^{\oplus}$
iii) $\overset{\ominus}{O}H$
?

(ii) 

$NaNo_2$
$H^{\oplus}$
?

(iii) 

$H^{\oplus}$
?

Q.3 Write a note on following 12

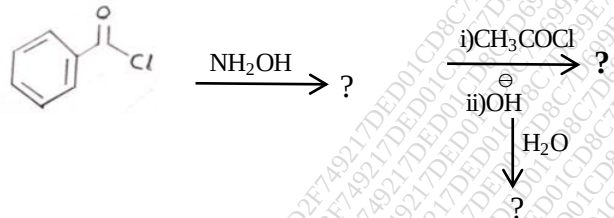
(i) Hantzsch condensation
(ii) Peterson olefination
(iii) Hoffman-Loffler-Freytag reaction

Q.4 Attempt the following 12

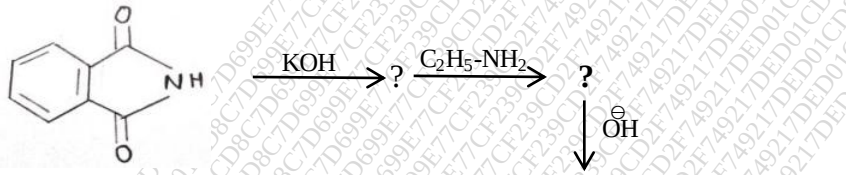
(i) Give the preparation and physical properties of benzodiazepine
(ii) Discuss the Reissert Indole synthesis
(iii) Explain how iso-oxazole derivatives can be used to prepare azetidine.

Q.5 Complete the following reaction sequence with mechanism. 12

i)




ii)

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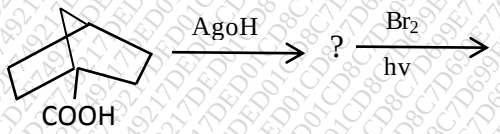
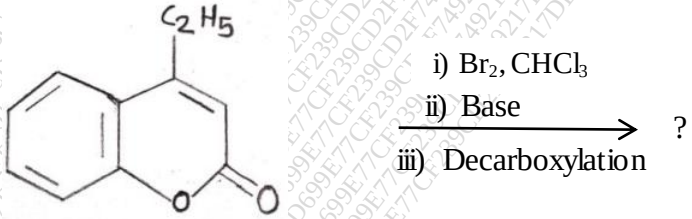
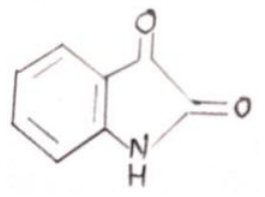



Q.6 Complete the following reaction with mechanism 12

i)

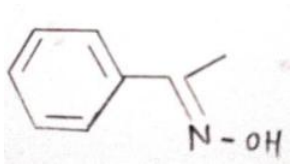


ii)



i) $KOH/H_2O$
ii) $CH_3COCH_3$
→ ?
iii) Base
iv) H+Δ

iii)



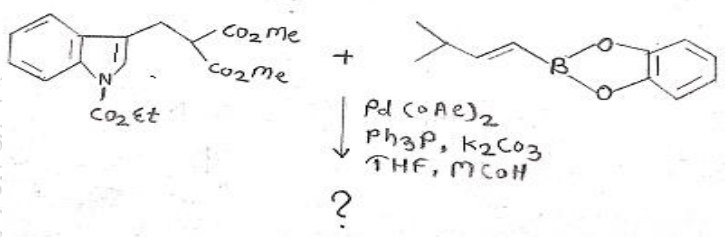

i) n Bu Li
→ ?
ii) $CH_3OCOC_6H_5$

Q.7 Explain the following 12

(i) Synthesis of flavones by using o-hydroxy acetophenone
(ii) Pyrimidine (PKa=1.30) is much less basic than pyridine (PKa=5.3)
(iii) Compare the electrophilic aromatic substitution of imidazole and oxazole.

Q.8 Attempt the following 12

a) (i)

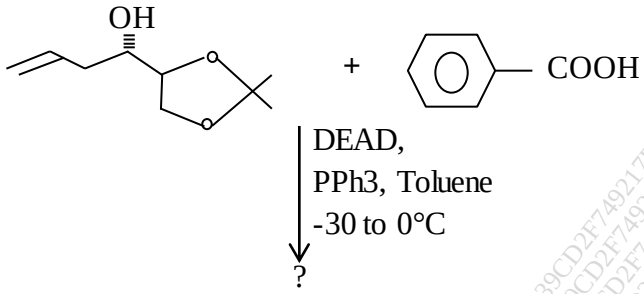



(ii)

(i) $I_2, AgCO_2R, H_3O^{\oplus}$
→ ?
(ii) $\overset{\ominus}{O}H, H_2O$

b) Complete the following reaction

(i)




(ii) Write note on Mannich reaction.

Total No. of Printed Pages:02

**SUBJECT CODE NO:- R-6076**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Petrochemical & Polymer Analysis-CHEA-419**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Q.No.1 is compulsory.
2) Attempt any five questions from Section B.
3) Figures to the right indicate full marks.
4) Use single answer sheet for Section A and B.
5) Non-programmable calculator is allowed.

Section A

Q.1 Answer the following short question. 20

1) What is polymerization?
2) What are the types of degradation?
3) What is fuel?
4) Define the term anti-oxidant.
5) What are the applications of polystyrene?
6) Explain the mining of petroleum.
7) What do you mean by cocking coals?
8) Write the full form and structure of PAN.
9) Define the term octane number.
10) What are the properties of polyamide?

Section B

Q.2 Answer the following questions:- 12

i) Explain in detail classification of polymer.
ii) What is the method of preparation of polyethene? Give its application.

Q.3 Answer the following questions:- 12

i) With a suitable example explain the mechanism of free radical polymerization.
ii) Explain in detail photodegradation.

Q.4 Answer the following questions:- 12

i) Explain the proximate analysis of coal. Give the role of ash in it.
ii) A polymer mixture contains two polymer in 2:3 ratio with molar mass 25,000 and 5,000. Calculate the mass average and number average molecular masses of polymer mixture.

Q.5 Answer the following questions:- 12

i) Explain the mechanism of branching and cross linking polymerization.

ii) Describe the method for the general treatment given to the residual liquid of petroleum.

Q.6 Answer the following questions:- 12

i) Explain the degradation of polymer by ultrasonic waves.

ii) With neat and schematic diagram explain determination of aniline point.

Q.7 Answer the following questions:- 12

i) Explain the method of preparation of polyparaphenylene.

ii) Write a short note on artificial solid fuel and industrial solid fuel.

Q.8 Answer the following questions:- 12

i) Explain the mechanism of ionic polymerization.

ii) How will you access the quality of coal? Explain

Total No. of Printed Pages: 03

**SUBJECT CODE NO:- R-6077**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Chemistry of Natural Products- CHEO-419**

**[Time: Three Hours]** **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Q.1 is compulsory.
2) Attempt any five questions from Q.2 to Q.8
3) Figures to right indicate full marks.

Q.1 Select the correct alternatives from the followings:- 20

1) Transcitral is known as
   a) Neral b) Geranial c) Nerol d) Geraniol

2) $\alpha$- Terpineol is having ---------- hydroxy group.
   a) Primary b) secondary c) Tertiary d) Geminal

3) In Hoffmann exhaustive methylation method alkaloids are treated with excess of ----------
   a) $CH_3I$ & $AgOH$ b) $CH_3I$ & $HCl$
   c) $CH_3Cl$ & $HCl$ d) $CH_3Br$ & $HBr$

4) Tobacco is commercial name of ----------
   a) Coriine b) Ephedrine c) Atropine d) Nicotine

5) Steroids are the compounds which gives ---------- when distilled with selenium at 360°C.
   a) Caretenoids b) Terpenoids
   c) Alkaloids d) Diels hydrocarbon

6) Bile secreted by liver contains ----------
   a) Amines b) Esters c) Bile acids d) Fatty acids

7) 2-phenyl benzo-r-pyrone is known as ----------
   a) Flavanol b) Chalcone c) Qurcetin d) Flavone

8) Cyanin chloride possess ---------- hydroxyl groups.
   a) 1 b) 3 c) 5 d) 4

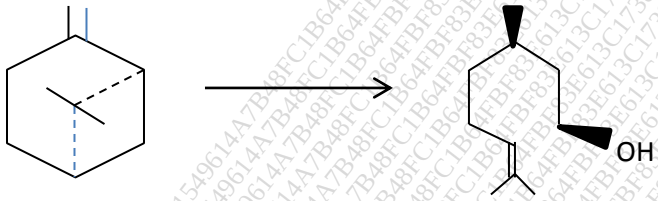
9) Squalene is formed due to head to head condensation reaction between two molecules of ----------
   a) PPP b) FPP c) FFP d) NAD

10) 4-Hydroxy-3-methoxy phenanthrene is known as ----------
a) Morphine b) nicotine c) Terpin d) Quinine

Q.2 Provide an appropriate synthetic route for the following:- 12

1)


2)




3) Cholesterol ⟶ Testosterone

Q.3 Explain the following 12

1) Shikimic acid pathway
2) Diels hydrocarbon
3) Isoprene rule and special isoprene rule in terpenoids

Q.4 Solve the following:- 12

1) Explain the synthesis of progesterone from stigmasterol.
2) Depict the stereostructure of following molecule.
i) Abietic acid
ii) Ephedrine
iii) Androsterone

Q.5 Answer the following:- 12

1) Outline the steps involved in following conversion—
Cholesterol ⟶ 5$\beta$- cholanic acid
2) Discuss synthesis of Histudine chloride.
3) Elucidate the structure of citral.

Q.6 Write short notes on following:- 12

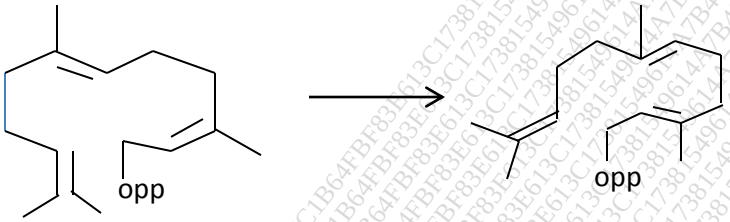
1) Position of side chain in cholesterol
2) Emede degradation
3) Cyanin

Q.7 Explain the following:- 12

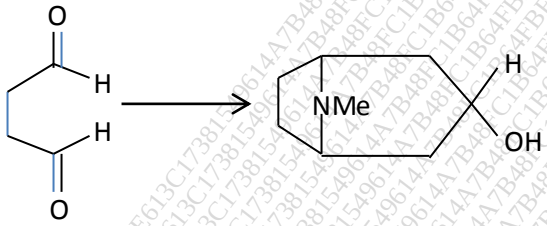
1) Baker-Venkatraman synthesis of flavones
2) Establish structure of Nicotine
3) $\beta$-Carotene synthesis.

Q.8 Outline the steps involved in following synthetic conversion/Bioconversion. 12

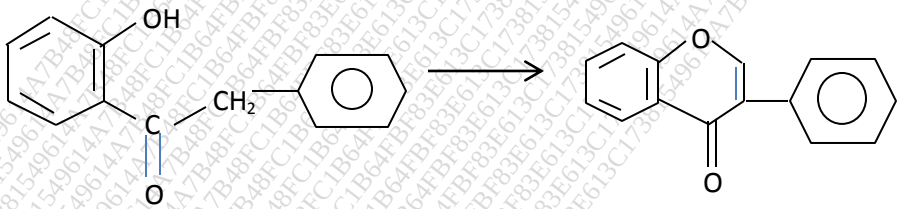
i)




ii)




iii)



Total No. of Printed Pages:03

**SUBJECT CODE NO:- R-6104**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Medicinal Chemistry -CHEO-420**

**[Time: Three Hours]** **[Max.Marks:80]**

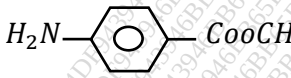
Please check whether you have got the right question paper.

N.B
i. Question number 1 is compulsory.
ii. Attempt any five questions from Q. No.2 to Q. No.8.
iii. Figures to right indicate full marks.

Q.1 Choose correct answer from the given questions. 20

i) Deficiency of Insulin caused _____disease.
a) Typhoid b) Collera
c) Diabetis d) None of these

ii) In pneumococcus which antibiotic is active
a) Penicillin G b) Streptomycin
c) Tetracyclin d) None of these

iii)  Structure represent which drug

a) Benzocaine b) Procaine
c) Orthocaine d) Metycaine

iv) Drug metabolism, important in assessment.
a) Drug efficiency & safety b) Evaluation of Toxic chemical
c) Both of these d) None of these

v) Chlorpromazine act as
a) Antibiotic b) CNS
c) Antipyretic d) None of these

vi) Classification of drugs based on
a) Therapeutic action b) Pharmacological action
c) Both of a & b d) None of these

vii) Which of the following is hypertensive drug
a) Verapamil b) Shuprofer
c) Atenolol d) Both a & c

viii) From streptomycin which antibiotic is isolated
- a) Chloramphsical
- b) Tolbutamide
- c) Troglitazone
- d) None of these

ix) Stimulant drugs are not used to treat
- a) Fatigue
- b) Insomnia
- c) Depression
- d) Induce sleep

x) A biologically active drugs which by Latentiation converted to inactive carriers -called as
- a) Soft drug
- b) Pro – drug
- c) Ideal drug
- d) None of these

Q.2 Attempt the following questions. 12
- i) Explain rate theory related to drug activity.
- ii) Discuss in detail biotransformation.

Q.3 i) Explain the following terms. 06
- a) LDSO
- b) Bioactivity
- c) Agonist

ii) Draw the structure of following drugs & give its clinical significance. 06
- a) Chloropromazine
- b) Captropril
- c) Diazepam

Q.4 Attempt the following questions. 12
- i) Write a note on CNS stimulants
- ii) Membrane active drug.

Q.5 Explain important steps involve in synthesis of following drugs. 12
- i) Ampicillin
- ii) Refecoxib
- iii) Verapamil

Q.6 Attempt the following questions. 12
- i) Discuss the efficiency and potency of drug.
- ii) Explain pharmacodynamics

Q.7 Attempt the following questions. 12
- i) Explain the metabolism of drug involving reduction and hydrolysis.
- ii) What are CNS drugs? Give its importance.

Q.8 Attempt the following questions. 12

i) What is diabetic mellitus? Classify it; give side effects and treatment of it.

ii) What is SAR? Explain with suitable example.

R-6103

Total No. of Printed Pages:2

**SUBJECT CODE NO:- R-6103**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-IV) Examination April/May 2019**
**Chemistry**
**Pharmaceutical, Clinical & Forensic Analysis-CHEA-420**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Section A is compulsory.
ii) Use same answer book for section A and B.
iii) Attempt any five questions from section - B
iv) Use of non – programmable calculator is allowed.

SECTION – A

Q.1 Answer the following questions. 20

i) Write the sources of particulate contamination.
ii) What is the composition of urine?
iii) Suggest the four names of antibiotics
iv) What is the prescription?
v) Mention types of record keeping.
vi) Give the structural formula of sulphonamide.
vii) List different system of medicine
viii) Define counter drug
ix) What do you mean by the term shelf life?
x) What is the full form of IP/USP/BP.

SECTION – B

Q.2 Answer the following questions. 12

i) Describe the estimation of blood sugar by Folin – Wu method.
ii) How will you carry out limit test for chloride and sulphate?

Q.3 Answer the following question 12

i) Explain radio immune assay.
ii) Describe the limit test for iron in drug.

Q.4 Answer the following question 12

i) Explain the term
a) Content of labels
b) Packaging material
ii) Explain method of determination of Narcotics, heroin and Morphine

Q.5 Answer the following question 12

i) Discuss the recent amendments in drug act.
ii) Discuss the working pattern of forensic laboratory.

Q.6 Answer the following question 12

i) Explain the term FDA. Give ISO standards.

ii) What is pharmacopeia? Describe the content of any one pharmacopeia.

Q.7 Answer the following question 12

i) Write a note on benzodiazepines. Explain any one

ii) How will you estimate the cholesterol and carbohydrate in serum sample.

Q.8 Answer the following question 12

i) What do you mean by lethal dose? Explain the significance of $LD_{50}$.

ii) How will you barbiturates.

Total No. of Printed Pages:2

**SUBJECT CODE NO:- R-6089**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-II) Examination April/May 2019**
**Chemistry**
**Physical Chemistry - CHE 208**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Questions No.1 compulsory
2. Attempt any five questions from questions number 2 to 8 .
3. Figure to the right indicates full marks.
4. Use of non programmable calculator is allowed.

Q.1 Attempt all the questions given below 20

i) Sketch wave function for an electron combined in one dimensional box.
ii) Write ladder operators.
iii) Give secular determinant for cyclo butadiene molecule .
iv) Determine atomic term symbol for a system with L=1 and S=1
v) Calculate the degree of freedom in the following systems.
   a) $CaCO_{3_{(s)}} \rightleftharpoons CaO_{(s)} + CO_{2_{(g)}}$
   b) Unsaturated aqueous solution of potassium chloride.
vi) Write note on reduced phase rule
vii) Calculate the simplest formula of compound if A type of atoms are present at corner and B type at the centre.
viii) Determine the miller indices of the crystal planes which cut through the crystal axis at $2a: \infty b: c \; and \; a: 3b: -2c$ .
ix) Explain in brief the term predissociation .
x) Explain P- type delayed florescence

Q.2 a) Derive an expression for energy of rigid rotator . 06

b) Calculate energy absorbed when an electron jumps from second to fourth energy level confined in one dimensional box of width 1.1A$^{o}$. 06

Q.3 a) What is variation principle? Write its applications to helium atom . 06

b) Calculate delocalized energy of 1, 3 butadiene molecule. 06

Q.4 a) Draw and explain pressure temperature phase diagram for one component system. 06

b) Calculate the change in melting point of ice per atmosphere increase of pressure if specific volumes of ice and water are $19.5 \times 10^{-6} m^3 \; and \; 18 \times 10^{-6} m^3$ respectively .(heat of fusion of ice is 80.3 cal . gm $^{-1}$) 06

Q.5 a) Give the classification of solids on the basic of shape of unit cells. 06

b) Silver crystalises in BCC pattern calculate the density of silver if its unit cell length is 2.5 $A^o$. 06

Q.6 a) Give different photophysical pathways and explain with the help of Jabconski diagram . 06

b) Explain Photo oxidation and photo dimerization . 06

Q.7 a) Explain perturbation method and write its application to helium atom . 06

b) Show that $[L_y L_Z] \neq 0$ 06

Q.8 a) Determine empty space in BCC and FCC. 06

b) Explain phase diagram of three component system with three pairs of partially miscible liquids. 06

Total No. of Printed Pages:04

**SUBJECT CODE NO:- R-6223**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-III) Examination April/May 2019**
**Chemistry**
**Photochemistry, Free Radicals & Pericyclic Reactions- CHEO-316**

**[Time: Three Hours]** **[Max.Marks:80]**

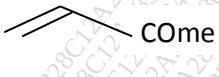
Please check whether you have got the right question paper.

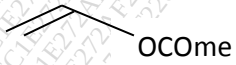
N.B 1) Question number one is compulsory.
2) Attempt any five questions from Q.2 to Q.8.

Q.1 a) Choose the appropriate answer for the following:- 10

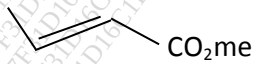
1) Under thermal condition for 1, 3, 5 hexatriene ---------- molecular orbital is LUMO.
a) $\Psi_2$ b) $\Psi_2^*$ c) $\Psi_4^*$ d) $\Psi_3$

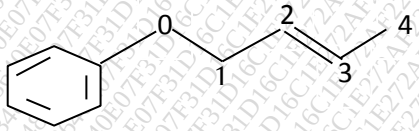
2) Free radicals are electrically ----------
a) Positively charged b) Neutral
c) Negatively charged d) Both a & c

3) Which of the following dienophiles is the most reactive in Diel's Alder reaction?
a) 

b) 

c) 

d) 


4) Which side-chain carbon makes a new bond to the benzene ring upon Claisen rearrangement of the following allylic phenyl ether?


a) $C_1$ b) $C_2$ c) $C_3$ d) $C_4$

5) A photochemically induced electrocyclic reaction involves which of the molecule's molecular orbitals?
a) HOMO -1 b) HOMO
c) LUMO d) LUMO +1

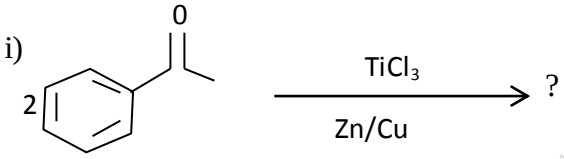
b) Explain the following terms: 04

i) Triplet state

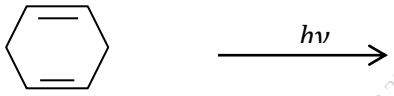
ii) Free radical inhibiters

c) Write the product (s) for following reactions. 06

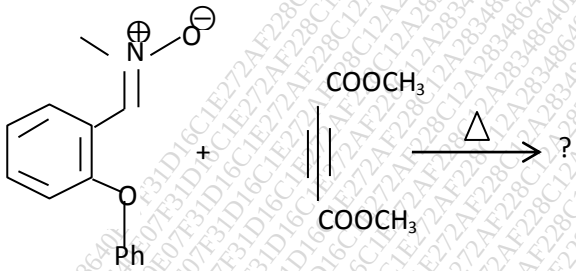
i)




ii)

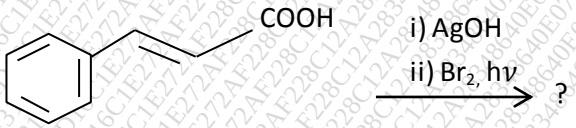



iii)

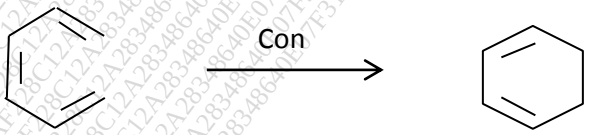



Q.2 Attempt the following:- 12

i) Predict the product & name of following reaction with mechanism.




ii) By using Frontier molecular orbital approach predict whether following reaction is thermally or photochemically symmetry allowed process.

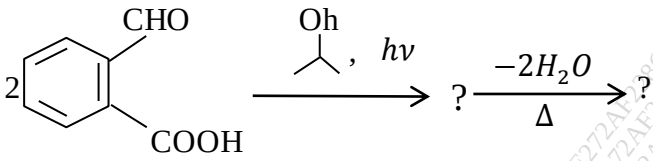


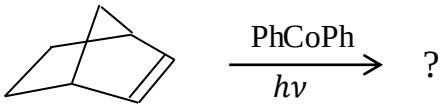

Q.3 Write a note on following:- 12

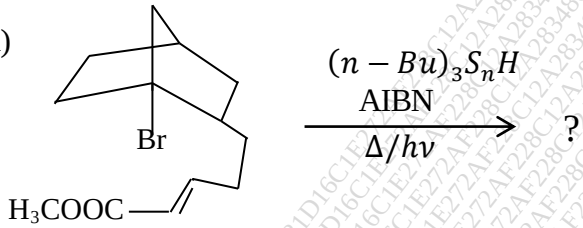
i) Cope rearrangement reaction

ii) Sandemeyer's reaction

Q.4 Predict the product (s) with mechanism of the following. 12

i) 

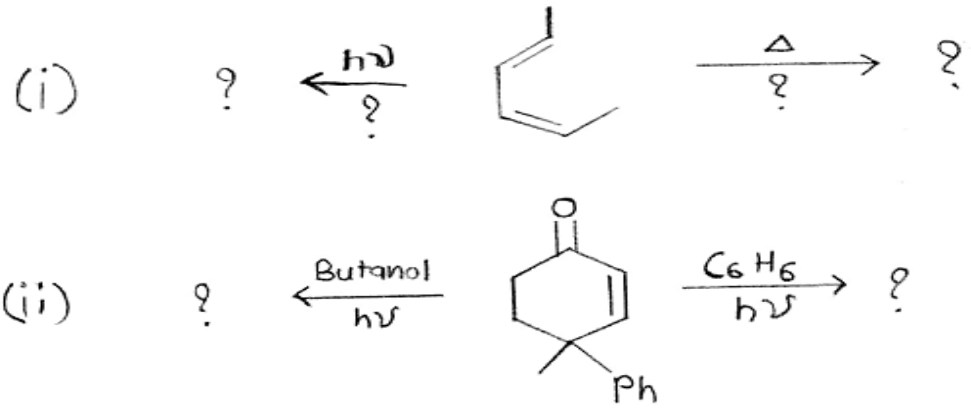

ii) 


iii) 

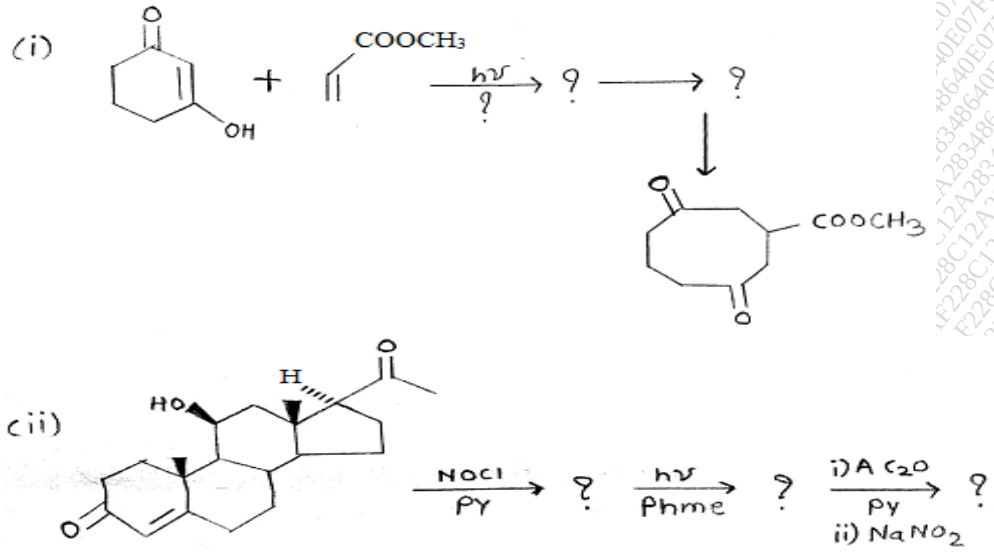

Q.5 Attempt the following. 12

1) Draw Pi-molecular orbital diagram for allylic carbocation & free radical.
2) By using Huckel Mobius orbital theory predict whether following reaction is thermally or photochemically symmetry allowed process.
   a) 1, 5 – sigmatropic rearrangement.

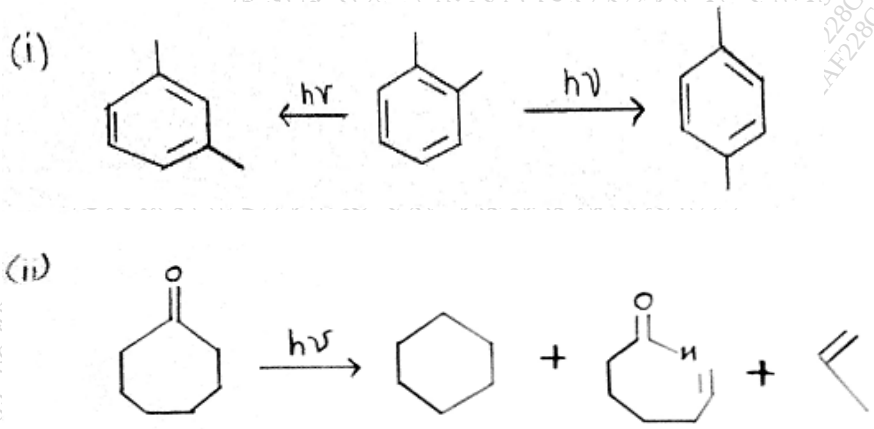
Q.6 Predict the product (s) with stereochemistry for following reaction with mechanism. 12



Q.7 Complete the following reactions with mechanism. 12




Q.8 Write the mechanism of following conversion. 12



Total No. of Printed Pages:2

**SUBJECT CODE NO:- R-6224**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-III) Examination April/May 2019**
**Chemistry**
**Advanced Analytical Techniques - CHEA- 316**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q. No. 1 is compulsory.
ii) Attempt any 5 question from section B.
iii) Non – Programmable calculator is permitted.

Section A

Q.1 A) Match the terms in A with those in B 05

| Group A | | Group B |
|---|---|---|
| i) | $\beta$ – rays | a) $^3A^* \rightarrow {}^3A + h\vartheta$ |
| ii) | Surface characterization | b) Hyphenated technique |
| iii) | Phosphorescence | c) SEM |
| iv) | Supercritical fluid | d) Radioactive part |
| v) | MS – MS | e) $CO_2$ |
| | | f) Automated method |

B) Fill in the blanks. 05

i) A radio isotopes has large value of P/n ratio. It will emits _____.
ii) Determination of the elemental composition of surface in two dimensional pattern is called as _____.
iii) The substance above its critical temperature and pressure (it's critical point) is called as _____
iv) In fluorescence and phosphorescence phenomenon _____ radiation is used.
v) In the reaction of $^{239}_{93}NP \rightarrow {}^{239}_{94}Pu +$? The missing particle is _____.

C) Choose the correct alternative of the following. 05

i) The process in which radionuclide decays into at least two pieces is called as
a) Fission b) Fusion c) Diffusion d) None of these

ii) The detector used for the x – ray absorption, emission and fluorescence can be.
a) Gas ionization detector b) Scintillation detector
c) Semiconductor detector d) All of these

iii) Emission of radiation during the electron transition from an excited level to a lower level (Usually to the ground level) without electron spin reversal is called as
a) Phosphorescence b) Fluorescence c) Chemiluminiscence d) None of these

iv) In electron spectroscopy secondary beam is made up of
a) X – ray photon b) Ions c) Neutrons d) Electrons

v) GC – MS is the type of
   a) Automation technique
   b) Hyphenation technique
   c) Ultra performance liquid chromatography
   d) None of these

D) Answer in on sentence. 05
   i) Explain the type of sampling of the surface.
   ii) Enlist the different hyphenated techniques.
   iii) What is Phosphorescence Phenomenon?
   iv) Write a note on photoelectric effect.
   v) Write the advantages of automated method.

Section – B

Q.2 1) What is chemiluminiscence? How it is used in monitoring air pollutants in air? 06
2) Write a note on 06
   a) Neutron activation energy
   b) Isotopic dilution analysis

Q.3 i) How x – ray are generated. How x – rays are utilized for analytical purposes? 06
ii) Write a brief note on 06
   a) Triplet state
   b) Doublet state
   c) Singlet state

Q.4 i) Explain in detailed, instrumentation of scanning electron microprobe. 06
ii) What is fluorometric analysis. Discuss some of its important applications. 06

Q.5 i) With schematic diagram explain the instrumentation of super critical fluid extraction. 06
ii) With the help of diagrams explain the instrumentation of atomic force microscope. 06

Q.6 i) What is discrete automatic systems. 06
ii) What is quenching? Discuss theory of fluorescence. 06

Q.7 i) Write a note on flow injection analysis. 06
ii) Explain in detailed, instrumentation of GC – MS. 06

Q.8 i) Discuss the principle and applications of HPTLC. 06
ii) Explain the emission of $\alpha - particle$ and $\beta - particle$ with suitable example. 06

Total No. of Printed Pages:2

**SUBJECT CODE NO:- R-6208**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-I) Examination April/May 2019**
**Chemistry**
**Physical Chemistry - CHE 104**

**[Time: Three Hours]** **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Q. No.1 is compulsory.
ii) Attempt any five questions from questions No.2 to 8.
iii) Figure to right indicate full marks.
iv) Use of non-programmable calculator is allowed.

Q.1 Answer the following questions in brief. 20

i) Show graphically the effect of ionic strength on rate constant when $Z_A Z_B > 0$ and $Z_A Z_B < 0$

ii) Calculate ionic strength of 0.05 m Barium Chloride.

iii) Write a note on Nernst hat theorem.

iv) Give the equation of entropy in terms of partition function.

v) Calculate the height to which liquid will rise in a capillary of radius 0.02 cm if its density is 0.874 gm $cm^{-3}$ and surface tension is 27.60 dynes $cm^{-1}$.

vi) What are surfactants? Give its classification.

vii) Write a note on Debye-Falkenhagen effect.

viii) Give the advantages of DME.

ix) Explain salt effect.

x) Write a note on solubility product.

Q.2 a) Derive the rate equation for absolute reaction rate theory. 06
b) Describe flow method to study kinetics of fast reactions. 06

Q.3 a) Drive Bose – Einstein's distribution law. 06
b) How absolute entropies of solid, liquid and gases are determined. 06

Q.4 a) Discuss thermodynamics of micellisation in terms of mass action model. 06
b) Derive Gibbs adsorption isotherm. Write its significance. 06

Q.5 a) Discuss Debye-Huckel theory of strong electrolytes 06
b) Calculate the activity coefficients of $Na^+$ and $SO_4^{--}$ ions in 0.02 m solution of sodium sulphate. 06

| | | | |
|---|---|---|---|
| Q.6 | a) | Derive an expression for dissociation constant of polyprotic acid. | 06 |
| | b) | Discuss salt effect and solubility product. Write its applications. | 06 |
| Q.7 | a) | Explain the influence of solvent interms of single sphere model. | 06 |
| | b) | Discuss the rotational partition function. | 06 |
| Q.8 | a) | Derive Ilkovic equation. | 06 |
| | b) | Discuss thermodynamics of micellisation in terms of phase separation model. | 06 |

Total No. of Printed Pages:03

**SUBJECT CODE NO:- R-6115**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-I) Examination April/May 2019**
**Chemistry**
**Analytical Chemistry -CHE 101**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Question No. 1 is compulsory.
2) Solve any five from Section B.
3) Non – programmable calculator is allowed.

Section A

Q.1 A) Match the term in A with those in B 05

| A | | B |
|---|---|---|
| i) | Significant figure in 0.03021 | a) Coating material used in TLC |
| ii) | Alumina | b) Column Chromatography |
| iii) | Optical Detector | c) 4 |
| iv) | Gas-Solid Chromatography | d) $\sigma = \sqrt{\frac{\sum(x_i-\mu)^2}{N-1}}$ |
| v) | Standard Deviation | e) Solid adsorbent is stationary Phase |

B) Fill in the blanks with appropriate words. 05

1) Technique in which porous material is used as stationary phase is known as----------
2) Reproducibility of the result is known as ----------
3) The results of an analysis are 36.97 gm, compared with the accepted value of 37.06 gm. The error occurs will be----------
4) When stationary and mobile both the phases are liquid it is termed as ----------
5) Calculate mean , if the iron analysis results are 41.7, 48.6, 45.1, and 51.3 mg----------

C) Answer in one sentence. 05

1) State mathematical expression for determination standard deviation in N set of measurements.
2) With respect to sample size and column diameter how efficiency of separation in liquid chromatography is improved?
3) Define Q Test.
4) Define Ion exchange chromatography.
5) Define analytical chemistry.

D) Select the most appropriate answer from the following: 05

1) Carrier gas used in GC is
a) $H_2$ b) Cl c) Br d) None

2) Gas-Solid chromatography is used for separation of
   a) Volatile organic compounds b) Inorganic species
   c) Low molecular weight gaseous species d) None of above

3) The volume of sample loop in HPLC is
   a) 5$\mu$l b) 20$\mu$l c) 15$\mu$l d) None of these

4) Which of the following is not a column type liquid chromatography
   a) Gel Permeation b) Ion exchange c) Liquid-solid d) Paper Chromatography

5) In chromatogram, position of peaks on time axis can be used to determine
   a) Components of sample b) Amount of sample c) Column efficiency d) All of these

Section B

| | | | |
|---|---|---|---|
| Q.2 | a) | What are errors? Explain its types. | 06 |
| | b) | Justify whether multiple extraction of solute with small volumes of solvent is better than single extraction with large volume. | 06 |
| Q.3 | a) | Differentiate between successive and gradient modes of elution. | 06 |
| | b) | Write a note on ion exchange chromatography. | 06 |
| Q.4 | a) | Describe principle components of gas chromatography instrument and illustrate instrument in briefly. | 06 |
| | b) | Two students analyzed a sample of gold and obtained following results.<br>Set – I 107.861 , 107.870 , 107.881, 107.892<br>Set-II 107.777 , 107.778 , 107.779 , 107.780<br>Calculate standard deviation and rejection quotient (Q) in both set of values. | 06 |
| Q.5 | a) | Explain, How thin layer chromatography is superior to other chromatographic technique. | 06 |
| | b) | Give a schematic diagram of HPLC instrument. Describe its components. | 06 |
| Q.6 | a) | What is difference between normal phase and reverse phase chromatography? | 06 |
| | b) | Describe column parking in HPLC. | 06 |
| Q.7 | a) | The substance X and Y had retention times of 16.4 and 17.63 min on a 30cm column. Unretained species had 1.30 min retention time. The peak width ($W_e$) were 1.11, 1.21mm respectively. Calculate column resolution and average number of plates to elute substance Y. | 06 |
| | b) | What is Q test? Explain the rules involved in it. | 06 |

Q.8

a) Describe in brief types of columns used in gas chromatography. 06

b) Benzoic acid was extracted by benzene. The distribution coefficient is 40. IF 50 ml of an aqueous solution containing 0.004m mole of benzoic acid is contacted with 30ml of benzene, calculate the amount of benzoic acid in aqueous phase and benzene phase. 06

Total No. of Printed Pages:02

**SUBJECT CODE NO:- R-6031**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-II) Examination April/May 2019**
**Chemistry**
**Inorganic Chemistry - CHE 206**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B 1) Question no. 1 is compulsory.
2) Attempt any five questions from question no. 02 to 08.
3) Figure to the right indicates full marks.

Q.1 Attempt all questions:- 20

1) Define term symbol.
2) What is EAN rule?
3) Give two examples of metal clusters.
4) Define Hole-formalism.
5) $[CoCl_4]^{2-}$ is blue while $[Co(H_2O)_6]^{2+}$ is pink? Justify.
6) Determine Russell Saunder ground term symbol for $Cr^{3+}$ ion.
7) Calculate microstate for $d^3$ case.
8) What is the role of myoglobin in human life?
9) Write in brief about metallocone.
10) Predict the no. of unpaired electron in $2_F$ and $3_P$ state.

Q.2 a) Discuss magnetic exchange coupling. 06
b) Describe strong and weak field approach for the construction of correlation diagram. 06

Q.3 a) How $Fe(CO)_5$ is synthesized. Enlist the important properties of it. 06
b) Explain the preparation and properties of carbonyl Halides in metal carbonyl. 06

Q.4 a) How will you synthesize sodium nitro prusside? Give it's significance. 06
b) Discuss the structure and bonding in $[Cr(CO)_6]$ complex. 06

Q.5 a) Discuss Nitrogen fircation. 06
b) Explain structure and bonding in $[ReCl_3]_3$. 06

Q.6 a) Discuss Co-Salen complex. 06
b) Calculate EAN rule for the following:- 06
i) $Ni\,(Co)_4$
ii) $Mo(Co)_6$
iii) $V(Co)_6$
iv) $Fe(Co)_5$

Q.7 a) Absorption spectrum of $[CrF_6]^{3-}$ ion, give three bands at 14950, 22700,34400 $cm^{-1}$. Determine the Dq, B and $\beta$ values from the data given [ $\beta$ free ion = 918 $cm^{-1}$]. 06

b) Draw correlation diagram of $d^2$ in octahedral system. 06

Q.8 Write short note on:-

1) Zintl ion 06
2) Application of electronic spectra 06

Total No. of Printed Pages:04

**SUBJECT CODE NO:- R-6061**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**M.Sc. (Sem-II) Examination April/May 2019**
**Chemistry**
**Organic Chemistry - CHE -207**

**[Time: Three Hours]** **[Max.Marks:80]**

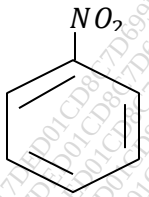
Please check whether you have got the right question paper.

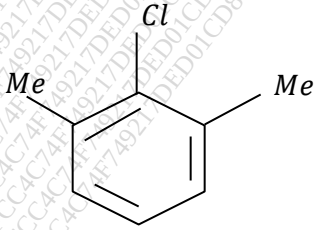
N.B 1) Question number one is compulsory.
2) Attempt any five questions from Q.2 to Q.8.
3) Figure to right indicate full marks.

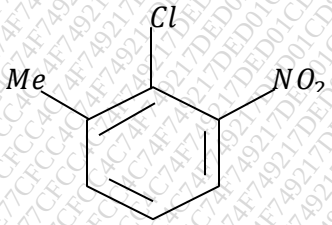
Q.1 A) Choose the correct option for the following:- 10

1) 1-butanol on dehydration in presence of concentrated $H_2SO_4$ gives
a) 1-butane b) Butanoic acid
c) 1-butane sulphonic acid d) None of these

2) Which of the following compound will not undergo aromatic substitution reaction through benzyne intermediate

a) 


b) 


c) 


d) All of these

3) Cinnamic acid can be synthesis from benzaldehyde using ---------- reaction.
a) Perkin Condensation b) Fries reaction
c) Claisen condensation d) Stobbe condensation

4) 3-bromo hexane on reaction with alcoholic KOH gives

a) 3- hexane
b) 2-hexene
c) 1-hexene
d) None of these

5) From the following, the least migratory aptitude is shown by

a) Phenyl
b) P-anisyl
c) Methyl
d) All of these

B) Solve the following:- 10

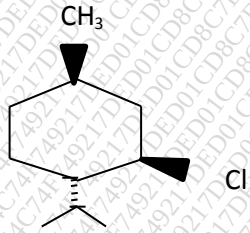
1) Explain in brief $E^{1CB}$ mechanism.
2) Write a short note on migratory aptitude.
3) Explain why nitrobenzene is used as solvent in Friedal-craft's reaction.
4) Explain in brief Benzoin condensation.
5) Explain in brief regio selectivity of electrophilic addition to carbon-carbon double bond.

Q.2 a) Explain the effect of substrate structure and leaving group on aromatic nucleophilic substitution reaction. 06

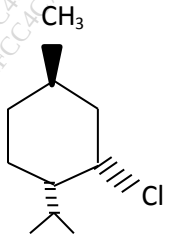
b) Write short note on sharpless asymmetric epoxidation. 06

Q.3 a) Explain with suitable examples addition of organo lithium reagent to saturated carbonyl compound. 06

b) In presence of sodium methoxide menthyl chloride undergo 250 times slower elimination than neo menthyl chloride, Explain 06




Menthyl Chloride



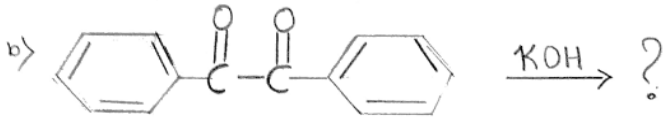

Neo Menthyl Chloride

Q.4 Write short note on:- 12

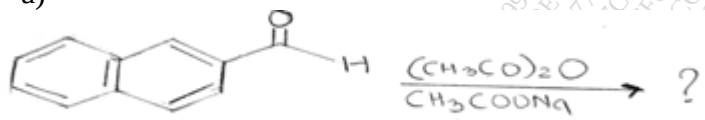
a) Wittig reaction
b) Fries rearrangement
c) IPSO substitution

Q.5 Predict the product (s) with mechanism. 12

a) $CH_3 - CH_2 - CH_2 - \overset{\oplus}{N}(CH_3)_2 - CH_3 \; Cl^{\ominus} \xrightarrow{\triangle}$ ?

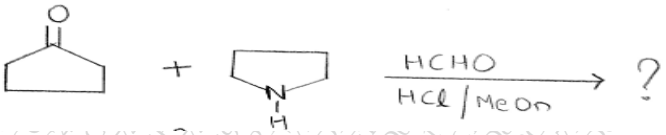
b) 

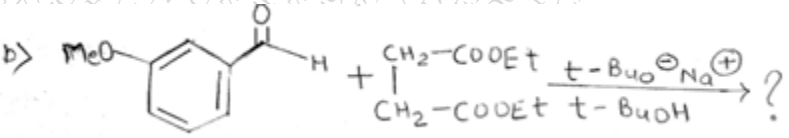

Q.6 Predict the product (s) with mechanism. 12

a) 


b) $CH_3 - NO_2 + CH_2 = CH - \overset{O}{\overset{\|}{C}} - OCH_2CH_3 \xrightarrow[CH_3CH_2OH]{CH_3CH_2O^{\ominus}Na^{\oplus}}$ ?

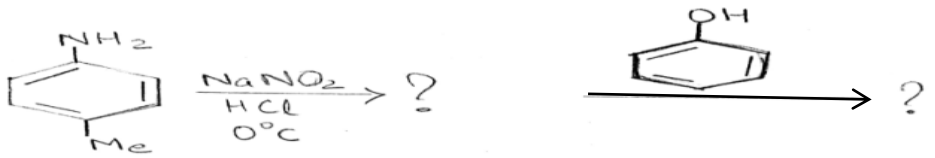
Q.7 Predict the product (s) with mechanism:- 12

a) 

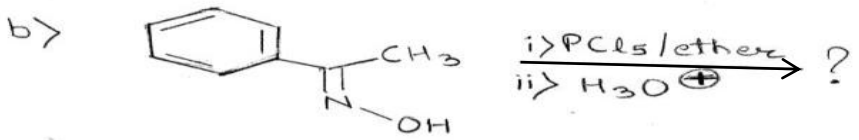

b) 

Q.8 Predict the product (s) with mechanism. 12

a)




b)




c)