

Total No. of Printed Pages:03

SUBJECT CODE NO:- F-6120
FACULTY OF SCIENCE
M.Sc (Sem I) Examination March/April 2018
Chemistry
Analytical Chemistry -CHE 101

[Time: Three Hours]

[Max.Marks: 80]

N.B

Please check whether you have got the right question paper.

- 1) Question No. 1 is compulsory.
- 2) Solve any five from Section B.
- 3) Use single answer books for Section A & B.
- 4) Non-programmable calculator is allowed.

Section A

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

05

A		B	
i)	F Test	a)	Extraction
ii)	Correlation Coefficient	b)	Linearity determination
iii)	Distribution Coefficient	c)	Test of significance
iv)	Sephadex	d)	Ion Exchange chromatography
v)	Amberlite	e)	Gel chromatography

B) Fill in the blank with appropriate word.

05

- i) ----- approaches to μ when confidence limit approaches to zero.
- ii) Glass beads are added during distillation to avoid -----
- iii) The difference between true value and observed value is called-----
- iv) The efficiency of Extraction ----- with number of small increments.
- v) In ----- analysis amount of a substance is measured.

C) Answer in one sentence:-

05

- i) What is resolution in chromatography?
- ii) How will you obtain analytical sample from bulk solid material of ore?
- iii) Define chromatography.
- iv) Define the term:-
 - a) Retention time
 - b) Retention volume
- v) What are the indirect methods of visualization in TLC?

D) Select appropriate answer in the following:-

05

- i) A representative part of bulk material is called
 - a) Fraction
 - b) Quotient
 - c) Analyte
 - d) Sample
- ii) Corning and quartering method is related
 - a) Rejection
 - b) Isolation
 - c) Sampling
 - d) Separation
- iii) Sample size can be reduced by
 - a) Evaporation
 - b) distillation
 - c) Extraction
 - d) Corning and quartering
- iv) The range for data 9.2, 9.4, 9.3, 9.9, 9.0 is
 - a) 0.4
 - b) 0.9
 - c) 0.2
 - d) 0.6
- v) The spread of the following data is 4.8, 4.6, 5.8, 4.9
 - a) 0.2
 - b) 1.1
 - c) 0.9
 - d) 1.0

Section B

- | | | |
|-----|--|----|
| Q.2 | a) How will you eliminate determinant error? | 06 |
| | b) What is confidence interval? Give its importance to decide true value. | 06 |
| Q.3 | a) How will you separate volatile substance from its aqueous solution? | 06 |
| | b) Write note on microwave assisted Extraction? | 06 |
| Q.4 | a) Write different applications of ion exchange chromatography. | 06 |
| | b) Why multiple extraction using small volumes of extractant is more efficient than a single extraction using large volume of extractants? | 06 |

- Q.5 a) Write the experimental technique to carry out the TLC of amino acids. 06
- b) Using the iron analysis results given below. Calculate the variance, σ^2 & standard deviation σ , if the true value, μ , is known to be 56.39% Fe 06

Trial	Fe%
1	56.12
2	56.45
3	56.20
4	57.60

- Q.6 a) Discuss the principle involved in different technique liq-liq extraction. Elaborate with suitable example. 06
- b) Discuss the following:- 06
- Personal Error
 - Methodic Error
 - Operational Error
 - Instrumental Error
- Q.7 a) Write a note on "Validation of a method". 06
- b) Compound Y has a distribution coefficient of 4.5 between water & chloroform. If 975 ml aqueous solution contains 35 μg of Y, calculate the volume of chloroform needed for single extraction to remove 99.00% of Y. 06
- Q.8 a) Write a note on Extraction of molecular species. 06
- b) Calculate, 06
- The number of theoretical plates for the chromatographic column given,
 $t_{RA} = 250 \text{ sec}$, $W_A = 15 \text{ cm}$
 $t_{RB} = 270 \text{ sec}$, $W_B = 17 \text{ cm}$
 - If the column is 120 cm long, Calculate H for this column.

SUBJECT CODE NO:- F-6197
FACULTY OF SCIENCE
M.Sc. (Sem III) Examination March/April 2018
Chemistry

Asymmetric Synthesis & Bio-Organic Chemistry – CHEO - 315

[Time: Three Hours]

[Max. Marks:80]

N.B

Please check whether you have got the right question paper.

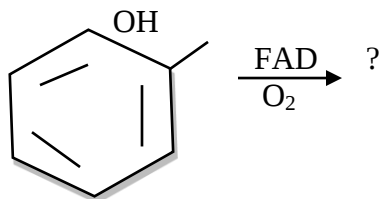
- i) Question number one is compulsory.
- ii) Attempt any five questions from Q.2 To Q.8.
- iii) Figures to the right indicate full marks.

- Q.1 A) Choose the correct option for the following. 10
- i) Apo enzyme + co-factor $\longrightarrow$?
 - a) Holo enzyme
 - b) Complex enzyme
 - c) Oxido reductase
 - d) Trasferase
 - ii) Which type of glycosidic linkage present in cyclodextrin?
 - a) Alpha 1, 4
 - b) Beta 1, 4
 - c) Beta 1, 6
 - d) Alpha 1, 6
 - iii) Ionophores are
 - a) Antibodies
 - b) Antigen
 - c) Antibiotic
 - d) Cofactor
 - iv) Carboxypeptidase enzyme contain
 - a) Mg
 - b) Na
 - c) Li
 - d) Zn
 - v) Alpha chymotrypsin secreted by,
 - a) Liver
 - b) Pancrease
 - c) Saliva
 - d) Esophagus

B) Complete the following reactions.

10

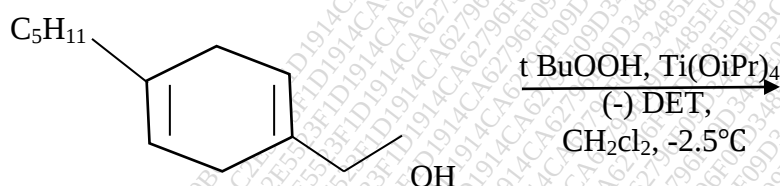
i)



ii)



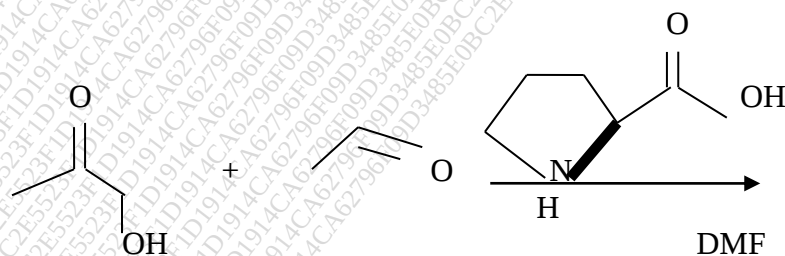
iii)



iv)



v)

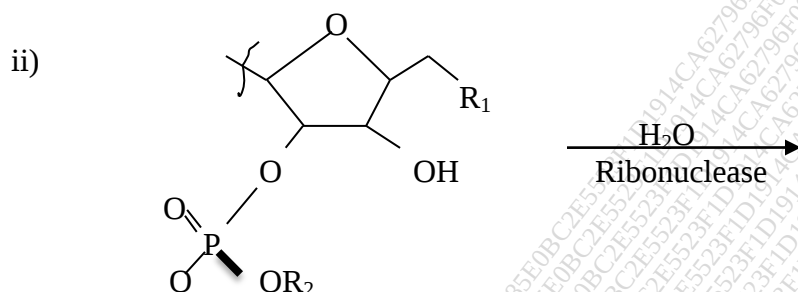
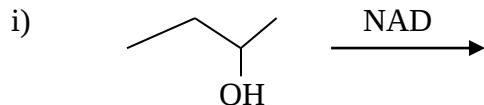


Q.2 i) Write note on α -chymotrypsin. 12
 ii) Give an account of crown ether.
 iii) Explain Enzyme Inhibition.

Q.3 i) Explain gel filtration chromatography for purification of enzyme. 12
 ii) Write note on FADH_2 catalysed reactions.
 iii) Write note on cyclodextrin.

Q.4 Predict the product with suitable mechanism.

12



- Q.5
- Give the five criteria for designing the good enzyme model.
 - Explain the secondary structure of enzyme.
 - Draw the structure of NAD.

12

- Q.6
- Give any two biotransformations carried by carboxypeptidase A.
 - Describe the classification of enzyme.
 - Write note on micelles.

12

- Q.7 write note on
- CBS reagent
 - Jacobson asymmetric epoxidation
 - Ionophores

12

- Q.8
- How does the temperature and pH affect the enzyme activity?
 - Write note on Ribonuclease
 - Write note on biotin.

12

Total No. of Printed Pages:06

SUBJECT CODE NO:- F-6135
FACULTY OF SCIENCE
M.Sc. (Sem III) Examination March/April 2018
Chemistry
Structural Elucidation by Spectral Methods CHE-313

[Time: Three Hour]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i) Q.No.1 is compulsory
- ii) Attempt any five questions from Q.2 to Q.8
- iii) Figure to right indicate full marks.

- Q.1 A) Choose the correct alternative for the following : 15
- i. Which of the following nucleus is NMR inactive
 - a. ^1H
 - b. ^{19}F
 - c. ^{13}C
 - d. ^{12}C
 - ii. Mossbauer effect is observed in
 - a. solid
 - b. liquid
 - c. gas
 - d. All of them
 - iii. ESR is given by
 - a. Diamagnetic substance
 - b. paramagnetic substance
 - c. Both a & b
 - d. None of them
 - iv. Which compound is used as reference standard in NMR spectroscopy.
 - a. t. alkyl halide
 - b. tetramethyl silane
 - c. carbon tetrachloride
 - d. CDCl_3
 - v. No of ^{13}C NMR signals in acetaldehyde
 - a. one
 - b. two
 - c. three
 - d. four

2018

- vi. Value of coupling constant for ortho coupling is $^1\text{H NMR}$
- 2Hz
 - 4Hz
 - 8Hz
 - 14Hz
- vii. Mossbauer signals obtained in $[\text{Fe}(\text{CN})_6]^{4-}$ complex ion
- one
 - two
 - three
 - zero
- viii. Most intense peak in mass spectrum having 100% abundance is called
- parent peak
 - meta stable peak
 - base peak
 - None of these
- ix. The distance between centers of two adjacent line in multiplet is
- Fermi resonance
 - chemical shift
 - coupling constant
 - spin-spin coupling
- x. Compound whose mass spectrum shows m/e at 156 (m^+ , base peak), 129 & 29
- $\text{C}_2\text{H}_5\text{Br}$
 - CH_3I
 - CH_3Br
 - $\text{C}_2\text{H}_5\text{I}$
- xi. Mossbauer effect studied in
- Radio frequency
 - microwave region
 - X-ray region
 - γ -ray region
- xii. Which of the following will not show ESR spectra.
- O_2
 - C_2H_6
 - N_2
 - Cu^{2+}

- xiii. No. of signal observed in ^{13}C NMR for propan 1-ol.
- one
 - two
 - three
 - four
- xiv. How many hyperfine lines are observed for $\dot{\text{C}}\text{H}_2\text{-CH}_3$ radical
- one
 - two
 - three
 - four
- xv. γ –hydrogen rearrangement followed by β -cleavage in mass spectroscopy is
- Nitrogen rule
 - Rule 13
 - Retro Diels Alder
 - McLafferty Rearrangement

Q.1 B) Match the following

05

Column A	Column B
1.ESR	1. ppm
2.NMR	2. microwave
3. Mossbauer	3. NMR inactive
4. ^{12}C	4. γ -ray
5. Chemical Shift	5. Radiofrequency

Q.2 Write a note on

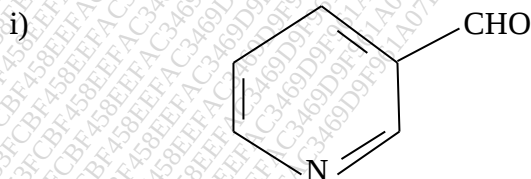
12

- magnetic anisotropy
- Nuclear over hauser effect
- Principle of Mossbauer spectroscopy.

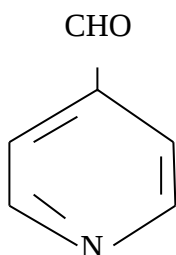
Q.3 Solve the following.

12

- Distinguish between the pair of compounds

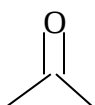


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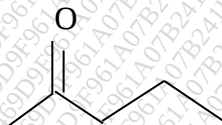


By ^{13}C NMR

ii)



&



by mass spectra

b) Deduce the structure and assign peaks/signals.

MF $\text{C}_9\text{H}_{10}\text{O}_2$

IR 1745, 1225, 749, 697 cm^{-1}

^1H NMR 1.96 δ (3H, S)

5.00 δ (2H, S)

7.22 δ (5H, S)

c) Deduce the structure & assign the signals

MF $\text{C}_6\text{H}_5\text{NO}$

IR 2720, 1710

PMR 7.24 δ (d, 2H)

8.7 δ (d, 2H)

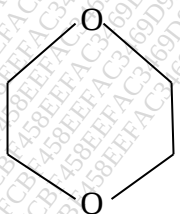
10.8 δ (S, 1H)

Q.4

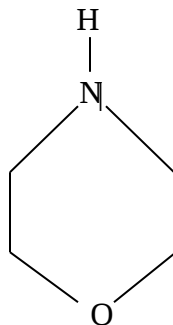
a) Distinguish the following pair

12

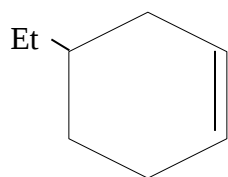
i)



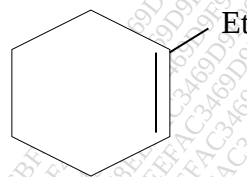
&



by ^{13}C NMR



&



By mass spectra

b) Deduce the structure & assign the peaks

M.F $C_6H_{10}O_3$
 IR 1745 cm^{-1}
 $^{13}\text{CNMR}$ 22 δ (q, 1c)
 15 δ (q, 1c)
 39 δ (t, 1c)
 170 δ (s, 1c)
 203 δ (s, 2c)

c) Deduce the structure & assign the peaks

M.F $C_6H_{12}O$
 IR 1715 cm^{-1}
 $^{13}\text{CNMR}$ 14 δ (q, 1c)
 22 δ (t, 1c)
 26 δ (t, 1c)
 43 δ (t, 1c)
 30 δ (q, 1c)
 190 δ (s, 1c)

Q.5 Solve the following 12

- Explain in detail fragmentation of n-propyl benzene
- Write a note on meta stable ion
- Explain retro diel Alders process in mass spectroscopy with examples

Q.6 Answer the following: 12

- Explain why Mossbauer spectrum of $[\text{Fe}(\text{CN})_6]^{3-}$ shows single line while $[\text{Fe}(\text{CN})_6\text{NO}]^{2-}$ shows double line
- Explain Isomer shift in Mossbauer
- Describe working of Mossbauer spectrometer with schematic diagram.

- Q.7 Solve the following 12
- Explain in detail ESR spectrum of 'H' atom.
 - Write a note on Zero field splitting & Kramer degeneracy
 - Define the terms in ESR
 - Fine splitting
 - Hyperfine splitting
 - Superfine splitting
- Q.8 Deduce the structure using following data and justify your answer 12
- MF C_8H_7OCl
 UV 260nm
 IR 1690,1600 cm^{-1}
 Mass m/e 154,156 (3:1 ratio)
 1H NMR 2.5 δ (s, 3H)
 7.3 δ (d J=8Hz 2H)
 7.8 δ (d J =8Hz 2H)
 - MF $C_7H_{12}O_4$
 UV 212nm E_{max} -60
 IR 2941-2857, 1742,1460 ,1056 cm^{-1}
 1H NMR 1.29 δ (t J=7.2 cps 6H)
 2.5 δ (s 2H)
 4.16 δ (q J=72 cps 4H)

Total No. of Printed Pages:4

SUBJECT CODE NO:- F-6181
FACULTY OF SCIENCE
M.Sc (Sem I) Examination March/April 2018
Chemistry
Organic Chemistry - CHE 103

[Time: Three Hours]

[Max.Marks:80]

N.B

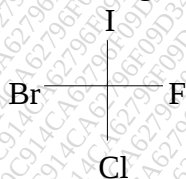
Please check whether you have got the right question paper.

- i) Question number 1 is compulsory.
- ii) Attempt any five question from Q.2 to Q.8
- iii) Figures to the right indicates full marks.

Q.1A) Select the correct option for the following (one mark for each question)

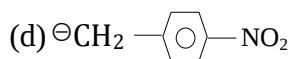
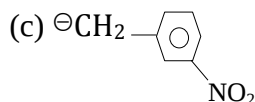
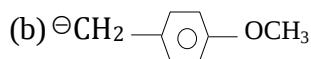
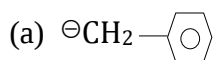
10

1. Enantiomers are of each other.
(a) Superimposable mirror images
(b) Non- Superimposable mirror images.
(c) not mirror images
(d) Both a and b
2. The hybridization state of carbon in triplet carbene is,
(a) sp^3
(b) sp^2
(c) sp
(d) sp^2
3. Which one of the following represent correct configuration for the isomer.



- (a) S
 - (b) R
 - (c) E
 - (d) Z
4. From the following which reagent does not act as nucleophile.
(a) OH^-
(b) Cl^-
(c) H_2O
(d) BF_4^-

5. From the following which carbanion is most stable.



6. The number of stereo isomers in 2-bromo, 3 chloro butane is,

- (a) Four
- (b) Three
- (c) Zero
- (d) Two

7. From the following the most unstable conformation of cyclohexane is,

- (a) Boat
- (b) Twist boat
- (c) Half chair
- (d) Chair

8. The hybridization state of carbon in carbocation is,

- (a) SP
- (b) SP^2
- (c) SP^3
- (d) none of these

9. From the following which is not an example of addition compound.

- (a) Catenanes
- (b) Fullerene
- (c) rotaxanes
- (d) cyclodextrins

10. From the following which reagent is act as electrophile.

- (a) SO_3
- (b) H_2O
- (c) R-NH_2
- (d) R-OH

(B) Answer the following questions (two marks for each question)

- i) Explain in brief alternant and non-alternant compounds.
- ii) Explain in brief diastereomers.
- iii) The boiling point of p-nitrophenol is higher than o-nitrophenol. Why?
- iv) t-butyl group is used to lock the ring flipping. Justify.
- v) SE' mechanism is analogues to SN' mechanism. Justify.

Q.2 Solve the following questions.

- (a) Explain with suitable example how isotopic labeling helps to predict the mechanism.
- (b) Explain with suitable example.
 - (i) Hyperconjugation
 - (ii) Keto-enol tautomerism

Q.3 Solve the following questions

- (a) Draw various conformation of 1,4 dimethyl cyclohexane. Comment on their optical activity and stability.
- (b) Write a note on SN^1 reaction.

Q.4 Solve the following questions

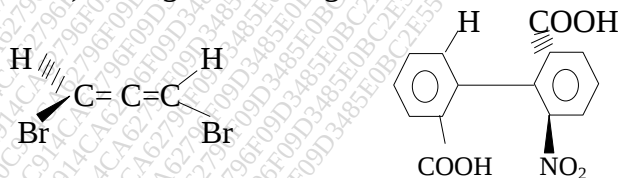
- (a) Explain with suitable example stereospecific and stereoselective reaction.
- (b) Write a note on Hammett equation.

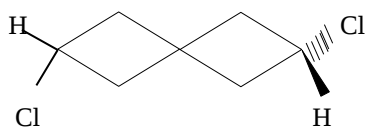
Q.5 Solve the following questions.

- a) PK_a for o-hydroxy benzoic acid is 3.0 and that of p-hydroxy benzoic acid is 4.6. Justify.
- b) The order of nucleophilicity in protic solvent is $\text{I}^- > \text{Br}^- > \text{Cl}^-$ while in a protic polar solvent is $\text{Cl}^- > \text{Br}^- > \text{I}^-$ Explain.

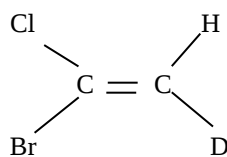
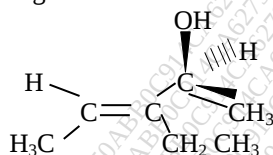
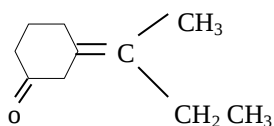
Q.6 Solve the following questions

- a) Assign R/S configuration for the following.





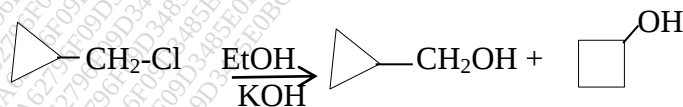
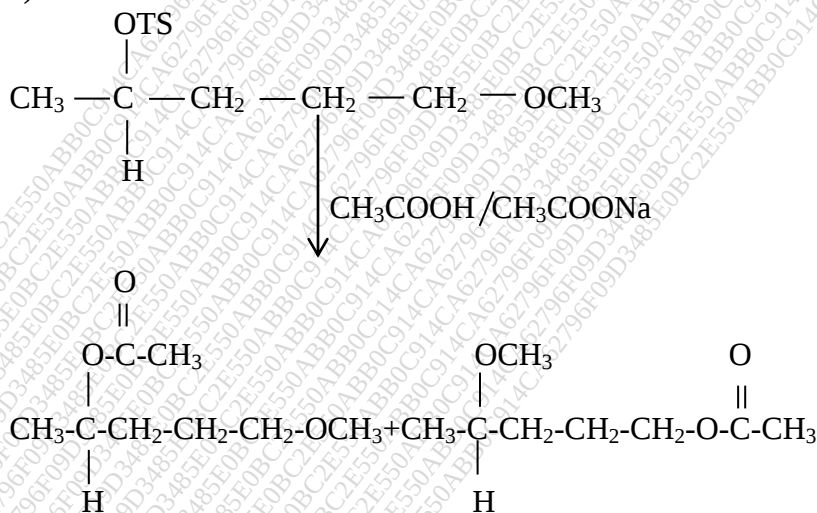
b) Assign E/Z nomenclature for the following.



- Q.7 Write a note on following 12
- Non classical carbocation.
 - Bonding and structure of fullerene
 - SET mechanism

- Q.8 Suggest the mechanism for the following 12

a)



SUBJECT CODE NO: F-6165
FACULTY OF SCIENCE
M.Sc. (Sem III) Examination March/April 2018
Chemistry
Organic Synthesis - CHEO-314

[Time: Three Hours]

[Max.Marks: 80]

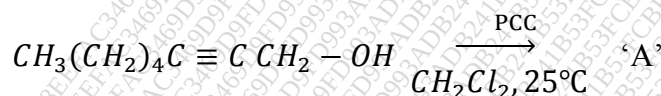
Please check whether you have got the right question paper.

N.B

- i) Question No.1 is Compulsory.
 ii) Attempt any five questions from Q. No. 2 to Q. No. 8.
 iii) Figure to the right indicate full marks.

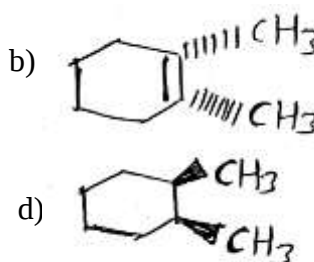
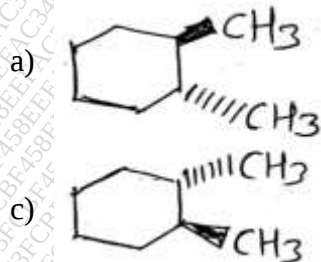
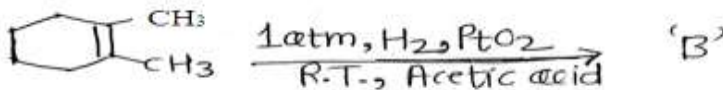
Q.1 A) Choose the correct options for the following: 10

- i) A solution of chromic acid and sulfuric acid in water is known as.
 a) Jones reagent
 b) Collins reagent
 c) Corey's reagent
 d) Wurtz reagent
- ii) The product 'A' in the following reaction is



- a) $\text{CH}_3(\text{CH}_2)_4\text{CH} = \text{CH} - \text{CH}_2 - \text{OH}$
 b) $\text{CH}_3(\text{CH}_2)_4\text{C} \equiv \text{C} - \text{OH}$
 c) $\text{CH}_3(\text{CH}_2)_4\text{C} \equiv \text{CCHO}$
 d) $\text{CH}_3(\text{CH}_2)_4\text{CH}_2 - \text{CH}_2 - \text{CHO}$

- iii) Which is the major product 'B' for the following transformation.



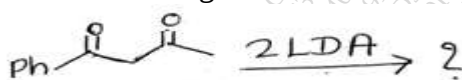
iv) Nitriles upon reduction will give

- a) Oximes
- b) Primary amine
- c) Secondary amine
- d) Tertiary amine

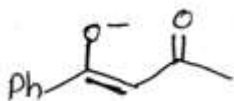
v) DCC is mainly used as

- a) Dehydrating agent
- b) Dehydrogenating agent
- c) Oxidizing agent
- d) Hydrating agent

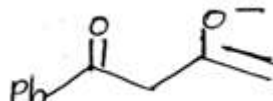
vi) Reaction of the following diketone with LDA yields.



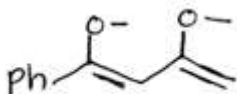
a)



b)



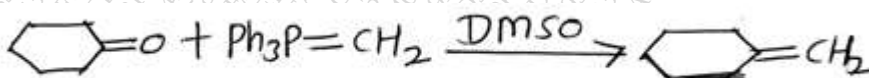
c)



d)



vii) The following reaction is known as



- a) Birch reduction
- b) Kolbe reaction
- c) Wurtz reaction
- d) Wittig reaction

viii) Alkyl lithium are generally prepared by reaction between lithium metal and an

- a) Alkane
- b) Halogen
- c) Hydrogen halides
- d) Alkyl halides

ix) Enamines are obtained by reaction of an aldehyde or ketone with a

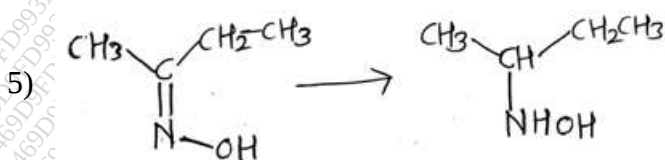
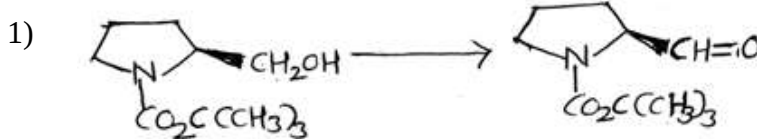
- a) Alcohol
- b) Ether
- c) Water
- d) Secondary amine

x) The reagents lithium dialcyl copper are also called as

- a) Gilman reagent
- b) Prevost catalyst
- c) Woodward reagent
- d) Fiescher reagent

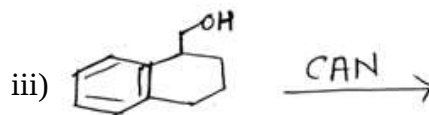
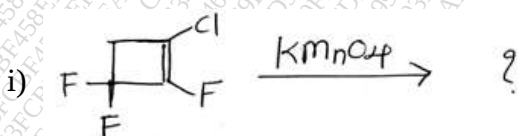
B) Suggest reagent (s) with conditions for the following conversions.

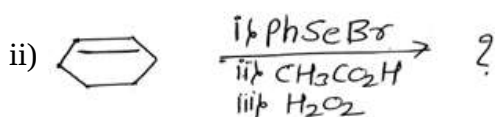
10



Q.2 Complete the following reactions.

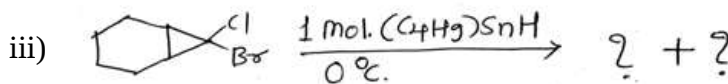
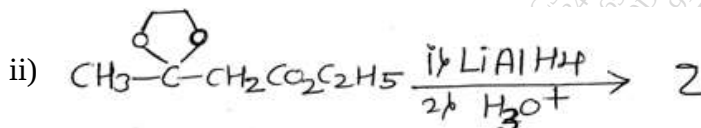
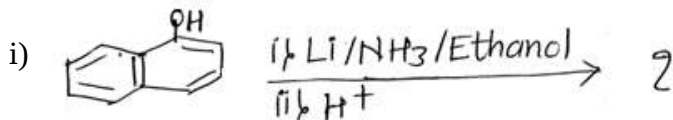
12





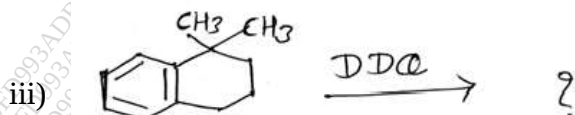
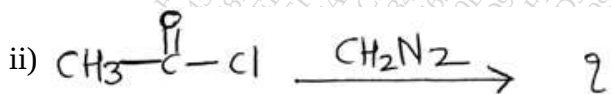
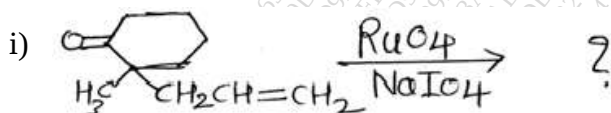
Q.3 Predict the product with mechanism.

12



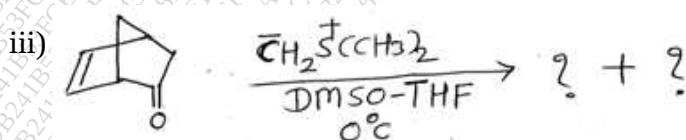
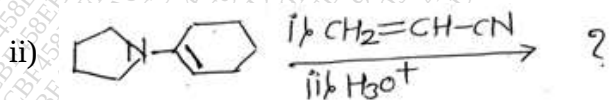
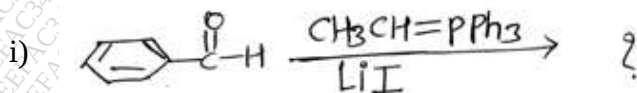
Q.4 Complete the following reactions with Mechanism.

12



Q.5 How will you carry out following transformations? Explain with mechanism.

12



Q.6 Explain following reactions with mechanism.

- Reformatsky reaction
- Etard reaction
- Wolf Kishner reduction.

12

Q.7 Write a note on following: (Any three)

- Organo magnesium
- Organo Copper
- Organo Boron
- Organo Silicon

12

Q.8 Give the synthetic applications of the following.

- 1,3 – Dithiane
- Wilkinson Catalyst
- PFC

12

Total No. Of Printed Pages:02

SUBJECT CODE NO:- F-6150
FACULTY OF SCIENCE
M.Sc. (Sem I) Examination March/April 2018
Chemistry
Inorganic Chemistry - CHE 102

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) All questions are compulsory in section-A.
- ii) Attempt any five questions from section-B.

SECTION-A

- Q.1 Answer the following: 20
- a) Define symmetry element.
 - b) What are the essential and trace elements?
 - c) What do you mean by acid hydrolysis?
 - d) What is meant by the labile complexes?
 - e) Define group.
 - f) Define thermodynamic stability.
 - g) Give any two functions of magnesium.
 - h) What are metallo drugs?
 - i) What do you mean by lability?
 - j) Give point group of FeF_6 .

SECTION-B

- Q.1 Answer the following 12
- a) Explain the following term
 - i) Identity E
 - ii) Improper axis of rotation
 - b) What are the applications of point group?
 - c) Define –
 - i) Sub group
 - ii) Order of group
- Q.2 Answer the following: 12
- a) Discuss the mechanism of inner sphere electron transfer reaction.
 - b) Explain the base hydrolysis with mechanism.
 - c) Explain polarization theory in brief.

- Q.3 Answer the following 12
- Derive mathematical expression of the relationship between stepwise and overall stability constant.
 - What are the factors affecting stability constant.
 - Determine the formation constant for binary complexes using pH-metric technique.
- Q.4 Answer the following 12
- Explain Murliken Symbolism rule with suitable example.
 - What are the point group of
 - C_2H_4
 - PCl_3
 - PCl_5
 - $C_2H_2Cl_4$
 - Give rule for construction of character table.
- Q.5 Answer the following 12
- Explain the anticancer activity of copper and Rhodium complex.
 - Explain the biological role of calcium and magnesium.
 - Illustrate the structure of myoglobin and hemoglobin
- Q.6 Answer the following 12
- Construct the character table of C_{3v} point group.
 - Predict the product

$$[Fe(CN)_6]^{4-} + [Fe(CN)_6]^{3-} \rightarrow$$

$$[Co(H_2O)_6]^{2+} + [Co(NH_3)_6]^{3+} \rightarrow$$
 - How will you explain standard reduction formula direct product & its uses?
- Q.7 Answer the following 12
- Give the classification of inorganic reaction.
 - What are the essential and trace elements?
 - Distinguish between kinetic stability and thermodynamic stability.

Total No. of Printed Pages:07

SUBJECT CODE NO:- F-6018

FACULTY OF SCIENCE

M.Sc. (Sem IV) Examination March/April 2018

Chemistry

Organic Synthesis Retrosynthetic Approach-CHEO-417

[Time: Three Hours]

[Max. Marks: 80]

N.B

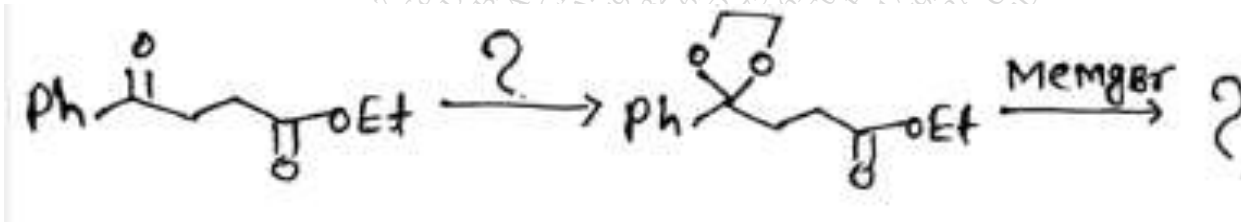
Please check whether you have got the right question paper.

- Question number one is compulsory.
- Attempt any five questions from Q.2 to Q.8.
- Figure to the right side indicate full marks.

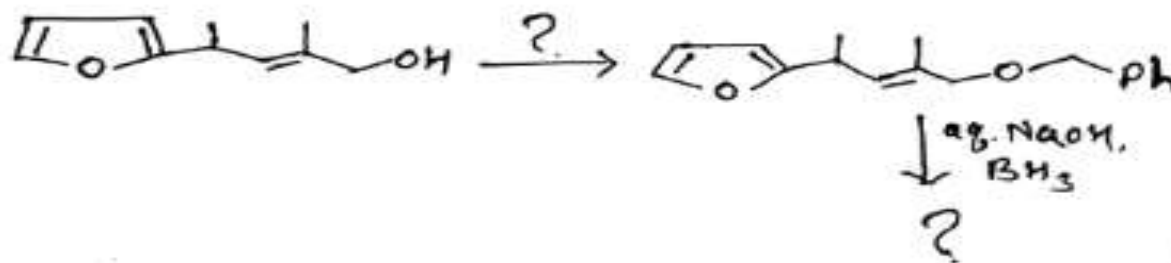
Q.1 Predict the product and reagent in the following:-

20

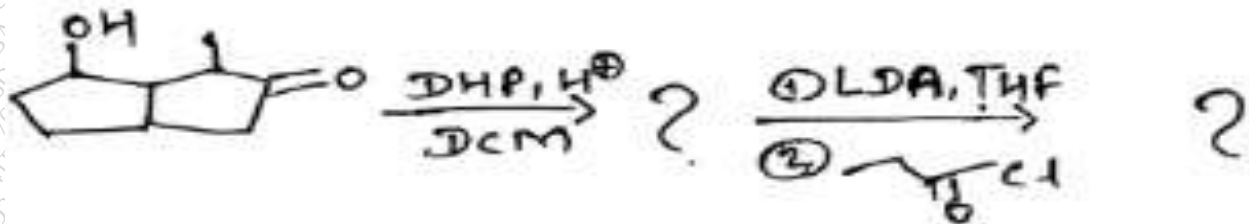
i)



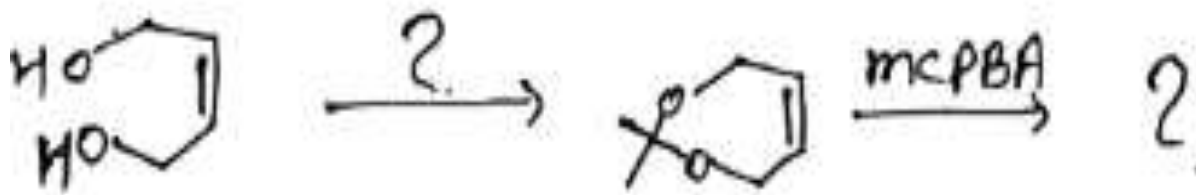
ii)



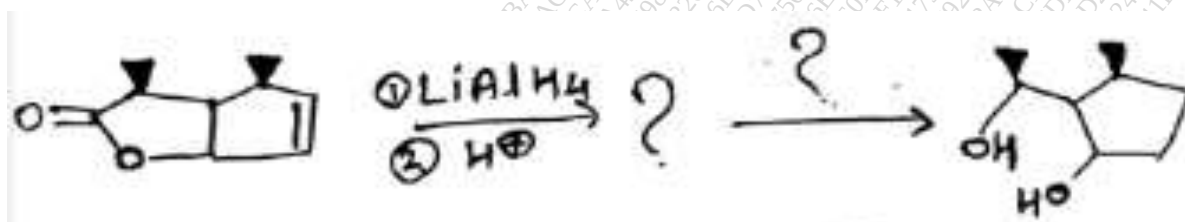
iii)



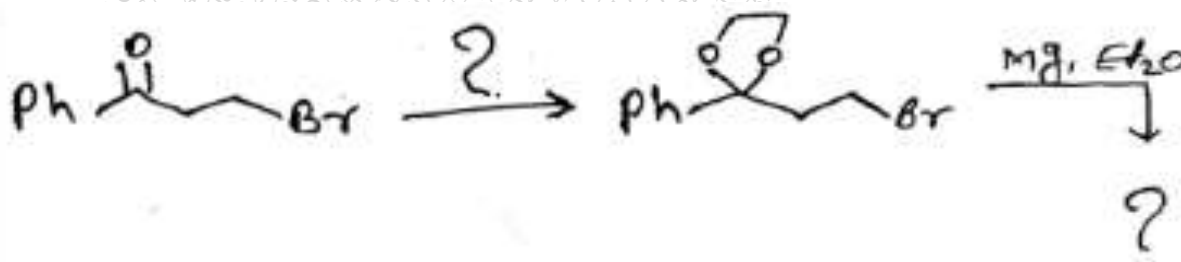
iv)



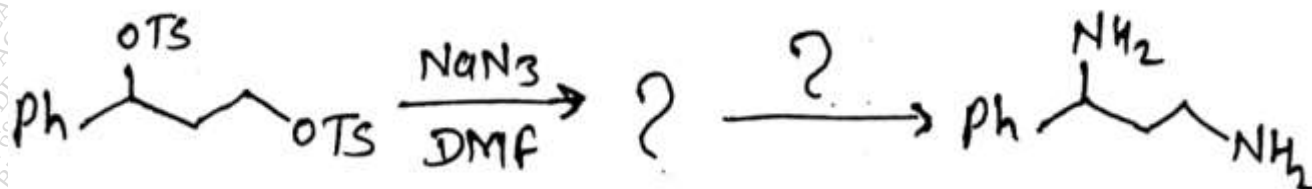
v)



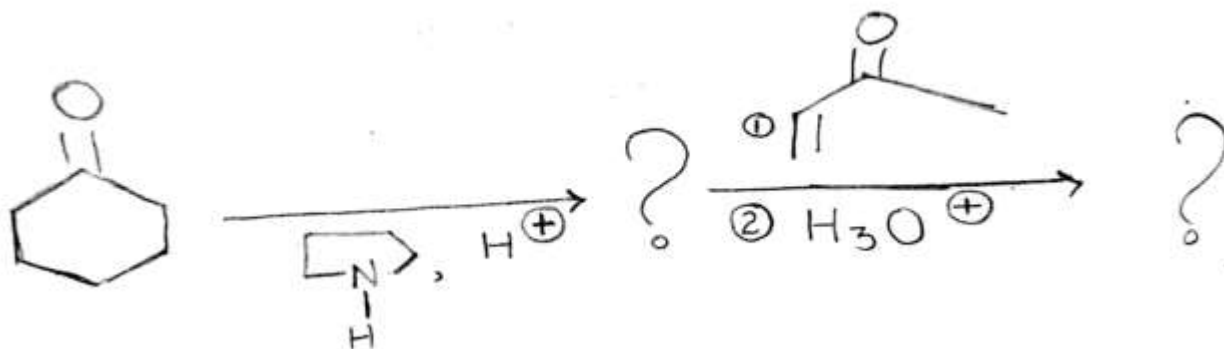
vi)



vii)



viii)

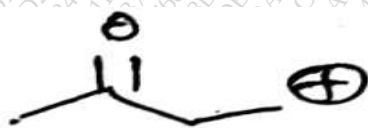


ix) Suggest the reagents / synthetic equivalent for the following synthons.

a)

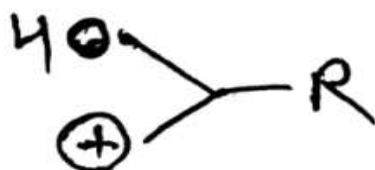


b)

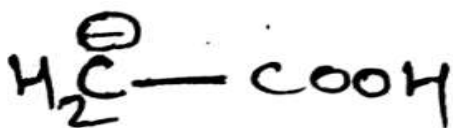


x) Suggest the reagents/synthetic equivalent for the following synthon.

a)



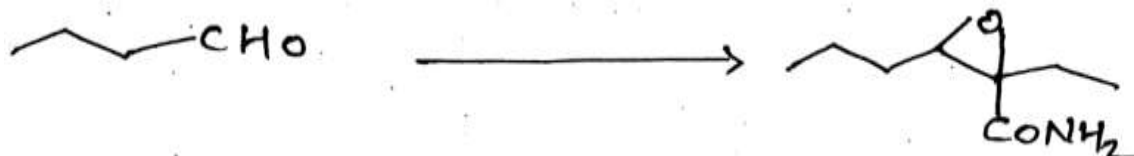
b)



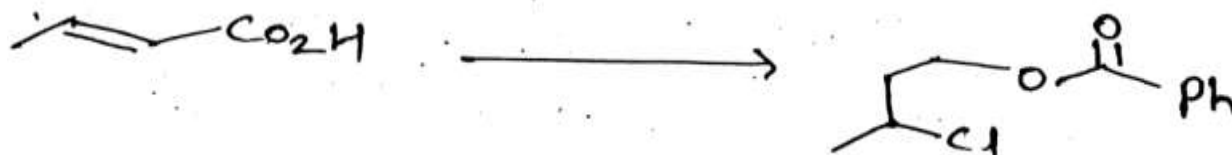
Q.2 Indicate reagents and conditions that would be appropriate for the following transformation.

12

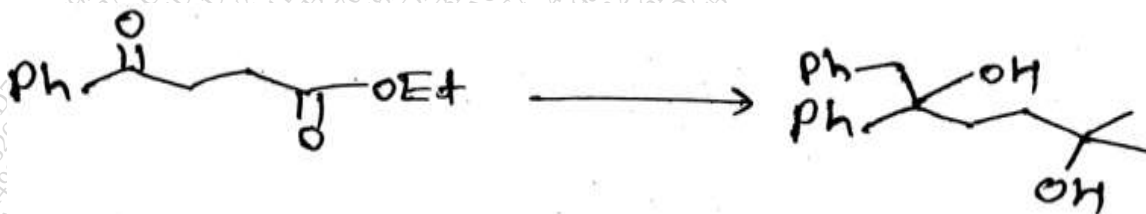
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ii)



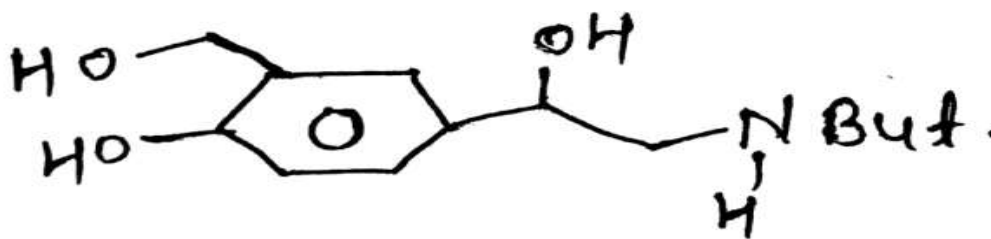
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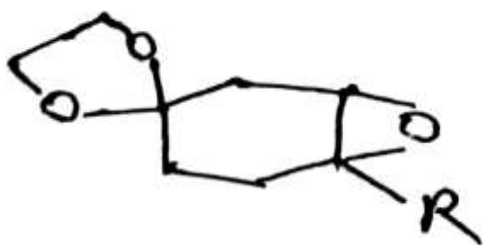
Q.3 Using retro synthetic analysis suggest suitable route for the synthesis of following molecules.

12

i)



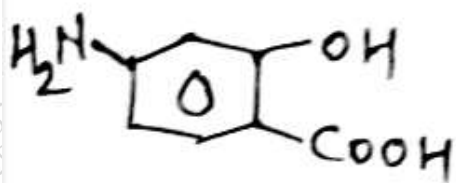
ii)



Q.4 Using retro synthetic analysis outline the synthesis of following molecules.

12

i)



ii)



iii)

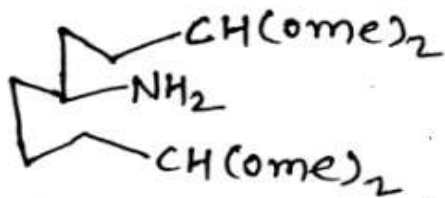


Q.5 Considering the following as Target molecule (TM) provide the details of retrosynthetic paths. 12

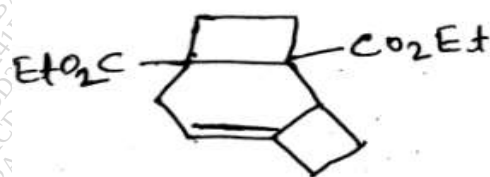
- i) Michael-Acceptor
- ii) B-Keto ester
- iii) Indole

Q.6 Using retrosynthetic analysis plan and design the synthesis of following molecules. 12

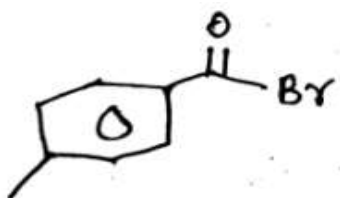
i)



ii)



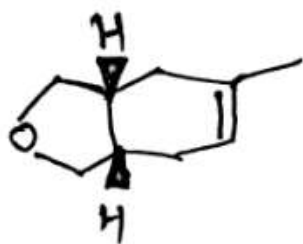
iii)



Q.7 Suggest retrosynthetic analysis and synthesis of the following compounds.

12

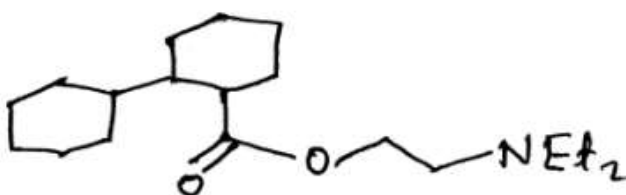
i)



ii)



iii)



Q.8 Give the synthetic route based on retrosynthetic analysis for the following molecules.

12

- i) Juvabione
- ii) Reserpine

Total No. of Printed Pages:2

SUBJECT CODE NO:- F-6017
FACULTY OF SCIENCE
M.Sc (Sem IV) Examination March/April 2018
Chemistry
Analysis of Ores, Alloys & Explosive – CHEA - 417

[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. Solve any five from Section B.
 3. Use single answer book for Section A and B.
 4. Non-programmable calculator is allowed.

Section- A

- Q.1 Attempt the following short questions. 20
- i) Give the composition of Brass alloy.
 - ii) Define ore. Mention their different types.
 - iii) What are paints? Give the role of thinner in it.
 - iv) Define the term Binder.
 - v) Give the full form of EDXRF and GC-TEA.
 - vi) Define the term Detonation.
 - vii) What is meant by glass?
 - viii) Define the term fulminates.
 - ix) Give the comment on "Plate glass".
 - x) What is meant by cosmetics? Enlist its names.

Section- B

- Q.2 a) Describe the analysis of drying oil by IR-method. 06
b) How will you determine the vanadium and chromium in stainless steel sample? 06
- Q.3 a) Describe the method for the analysis of Dolomite ore. 06
b) Give the analysis of face powder for Boric acid and magnesium content. 06
- Q.4 a) Give the classification of glass. How is lead glass determined? 06
b) Analyse the sample of Monel-metal alloys for its main constituents. 06
- Q.5 a) Explain the phenomenon of thermochemistry. 06
b) Give the analysis of cream for its physical and chemical constituents. 06

- Q.6 a) Analyse the Bauxite ore. Sample for its main constituents. 06
b) How will you determine ferric oxide and Aluminium oxide in cement sample? 06
- Q.7 a) Describe the analysis of glass for calcium and magnesium oxide. 06
b) What is meant by Borosilicate glass and softy glass? Explain. 06
- Q.8 a) Give the composition and analysis of calcite ore. 06
b) Discuss the phenomenon of flash point of paints. 06

SUBJECT CODE NO:- F-6002
FACULTY OF SCIENCE
M.Sc. (Sem II) Examination March/April 2018
Chemistry
Spectroscopic Methods of Analysis-CHE-205

[Time: Three Hours]

[Max. Marks: 80]

N.B

Please check whether you have got the right question paper.

- i) question no 1 is compulsory
 ii) solve any five from section B
 iii) use single answer book for section A & B
 iv) non- programmable calculator is allowed
 iv) figures to the right indicates full marks

Section A

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

05

A	B
i) Raman spectroscopy	a) MHz
ii) Infra-red	b) Range 400-800nm
iii) Lambert –Beer's law	c) Rayleigh
iv) Visible spectroscopy	d) $I = I_0 e^{-kx}$
v) J-coupling	e) Functional group
	f) $\frac{1}{2\pi} \sqrt{\frac{k}{\mu}}$

(b) Fill in the blanks with appropriate word

05

- i) The effect of virtue of which the absorption maximum is shifted towards longer wavelength is called _____
- ii) The space between the lines within a coupled multiplet is _____
- iii) The scattering of radiations without any change in frequency is known as _____
- iv) The ultraviolet spectroscopy is useful for the detection of _____
- v) The compound $H_3C - \underset{\substack{| \\ OH}}{CH} - CH_3$ will shows the _____ peaks.

(c) Answer in one structure sentence.

05

- i) Define the term spectroscopy
- ii) Can you distinguish a pair of enantiomers by Infra-red spectroscopy?
- iii) Define Stoke's line.
- iv) What is meant by chromophores?
- v) Define the term 'chemical shift'

(d) Select the most appropriate answer in the following

05

- i) Radio frequency radiations are useful in causing transition for
 - a) IR spectra
 - b) NMR spectrum
 - c) Raman spectra
 - d) None
- ii) The structural increment of 5nm for estimating λ_{max} for α,β - unsaturated carbonyl compound is given as
 - a) Exocyclic double bond
 - b) Alkyl substituent
 - c) Ring residue
 - d) All of these
- iii) Vibrational transitions exist in the region of spectrum of
 - a) Microwave
 - b) Infrared
 - c) Radio wave
 - d) None of these
- iv) Which of the following are microwave active?
 - a) HCl
 - b) Co₂
 - c) H₂
 - d) O₂
- v) Write the multiplicity of signals for $CH_3-CH_2-O-CH_2-CH_3$ in NMR spectrum
 - a) Two triplets
 - b) A triplet & a quartet
 - c) Two singlet
 - d) Two singlet's & two triplets

Section B

Q.2 Attempt the following questions:

06

- i) Define and explain the term
 - a) Zero point energy
 - b) Born –Oppenheimer
 - c) Harmonic oscillator
 - d) Overtones
- ii) Explain the instrumentation and applications of TGA

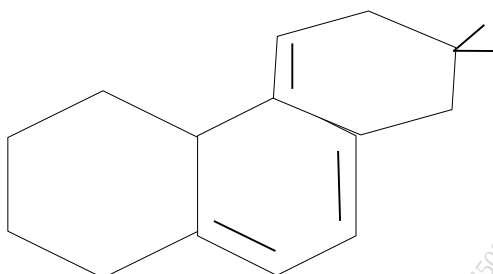
06

Q.3 Attempt the following questions:

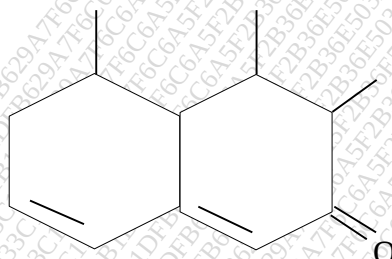
- Explain the principle and applications of Auger Electron spectroscopy
- Calculate the λ_{max} of the following

06

06



(a)



(b)

Q.4 Attempt the following questions:

- A compound having molecular formula $C_9H_{11}Br$ showed the following signals in PMR data:
 a) 2.25δ (multiplet, 2H)
 2.75δ (triplet, 2H)
 3.38δ (triplet, 2H)
 7.22δ (singlet, 5H)
 Deduce the structure with the help of given data :
 b) Deduce the structure with the help of given spectral data
 M. F: $C_6H_{12}O_2$
 UV: below 210 nm
 IR: 2924 cm^{-1} (m), 1745 cm^{-1} (s), and 1456 cm^{-1} (m)
 NMR : 1.97δ (s, 3H)
 1.45δ (s, 9H)

06

- Why TMS is used as an internal reference in NMR spectroscopy? Explain.

06

Q.5 Attempt the following questions:

- What is meant by electromagnetic radiations? Explain the various region of it.
- Explain the following terms of NMR
 - Number of signals
 - Position of signals
 - Splitting of signals

06

06

Q.6 Attempt the following questions

Total No. of Printed Pages:02

SUBJECT CODE NO:- F-6031
FACULTY OF SCIENCE
M.Sc. (Sem II) Examination March/April 2018
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. 01 is compulsory.
- 2) Attempt any five questions from question no. 02 to 08.
- 3) Figure to the right indicate full marks.

Q.1	Attempt all the following questions in brief.	20
	i) Define Hole formalism. ii) Calculate microstate for d^3 case. iii) What are invivo and invitro nitrogen fixation process? iv) Calculate EAN rule for $W(Co)_6$. v) Trans isomer of $[Co(e_n)_2]NO_3$ gives less intense bands as compared to cis isomer? Justify. vi) What do you mean by δ (delta) bonding? vii) Define metal nitrosyl. viii) Write in brief about metallocene. ix) What is the role of myoglobin in human life? x) Calculate spin orbit coupling for d^5 & d^6.	
Q.2	a) Discuss magnetic exchange coupling.	06
	b) Explain Racah parameter with suitable example.	06
Q.3	a) How $[Cr(Co)_6]$ is synthesized? Discuss the structure & bonding of the complex.	06
	b) Explain the preparation & properties of carbonyl halides in metal carbonyl.	06
Q.4	a) How will you synthesize sodium nitroprusside. Give it's significance.	06
	b) Discuss the structure & bonding in $W(Co)_6$.	06
Q.5	a) State & explain eighteen electron rule in nitrosyl complex of Iron.	06
	b) Discuss Co-Salen complex.	06
Q.6	a) Write short note on dinitrogen complexes with suitable example.	06
	b) Discuss anti ferromagnetism exchange pathway.	06

- Q.7 a) Discuss the structure & bonding in $[ReCl_3]_3$ 06
 b) Write short note on Zintl ions. 06
- Q.8 a) Draw Orgel diagram for d^2, d^3, d^7 & d^8 in octahedral system. Assign its electronic transition 06
 b) Draw Tanabe Sugano diagram for d^2 system. 06

SUBJECT CODE NO:- F-6062
FACULTY OF SCIENCE
M.Sc. (Sem II) Examination March/April 2018
Chemistry
Organic Chemistry - CHE -207

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

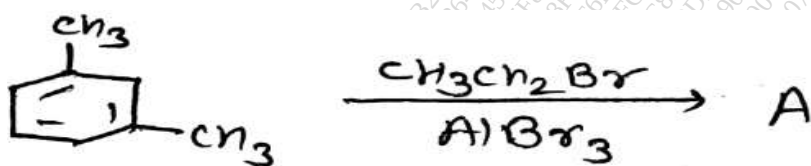
N.B

- 1) Question number 1 is compulsory.
- 2) Attempt any five question from Q.2 to Q.8
- 3) Figure to right indicate full marks.

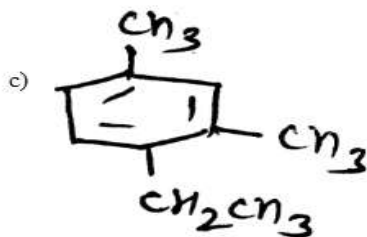
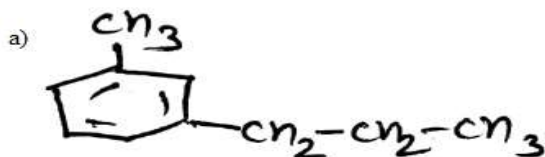
Q.1 A) Choose the correct option for the following:-

10

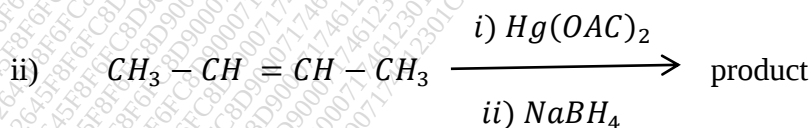
i)



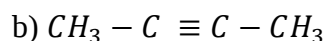
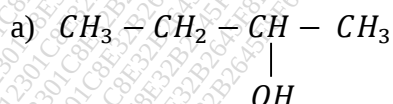
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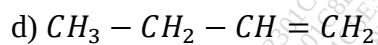
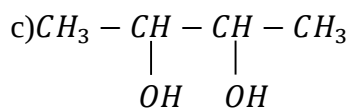


d) None of these

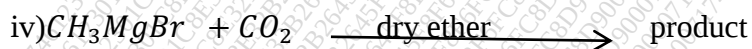
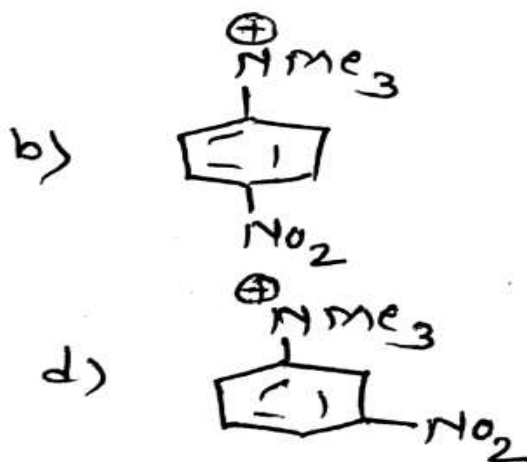
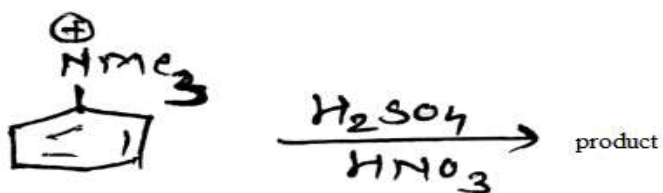


The product is

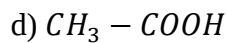
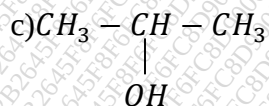
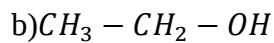
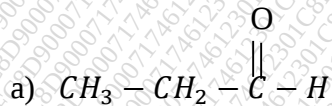




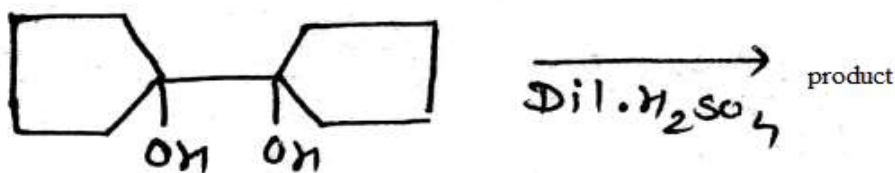
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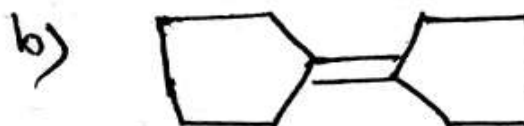
product is



v)



product is



d) None of these

B) Solve the following

10

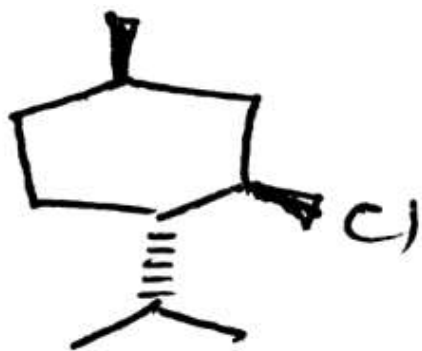
- Write a note on benzyne mechanism.
- Explain Stereochemistry of bromination reaction of C-C double bond.
- Explain with example E_2 reaction.
- Write a note on Wittig reaction.
- Write a note on Fries rearrangement.

Q.2 a) Explain with suitable example Friedel Craft's reaction. Give the advantages of Friedel Craft's acylation over alkylation. 06

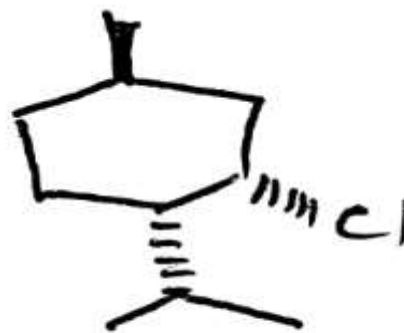
b) Write a note on Sharpless asymmetric epoxidation. 06

Q.3 a) Write a note on organo zinc reagent. 06

b) In presence of Sodium methoxide, neo methyl chloride undergo 250 time faster elimination than methyl chloride. Explain. 06



Menthyl Chloride

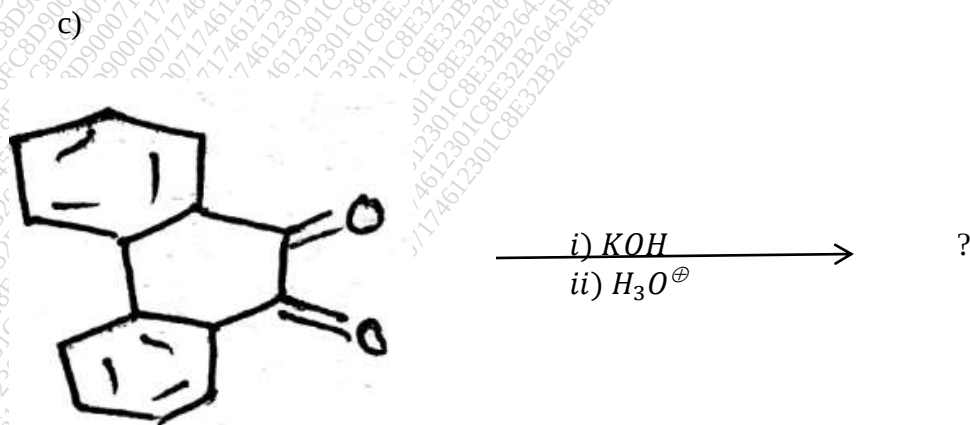
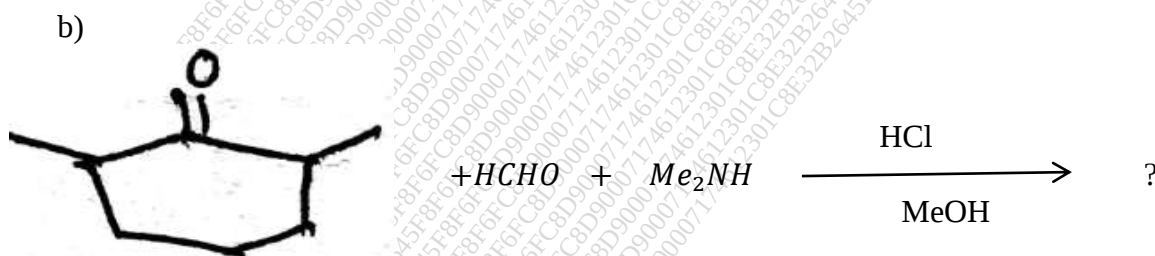
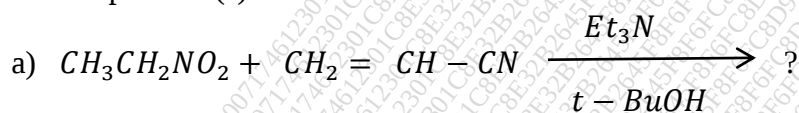


Neo Menthyl Chloride

Q.4 a) Write a note on Hoffman rearrangement. 06

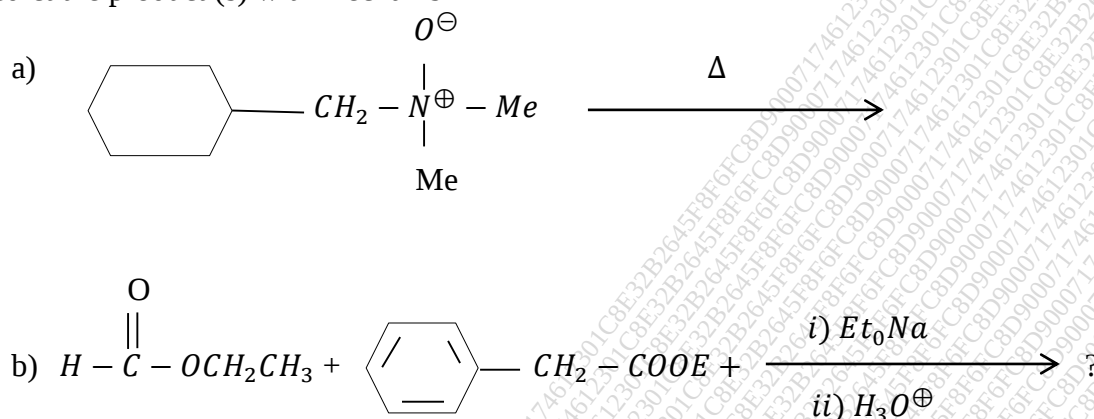
b) Explain the effect of leaving group and attacking nucleophile on aromatic nucleophile substitution reaction. 06

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



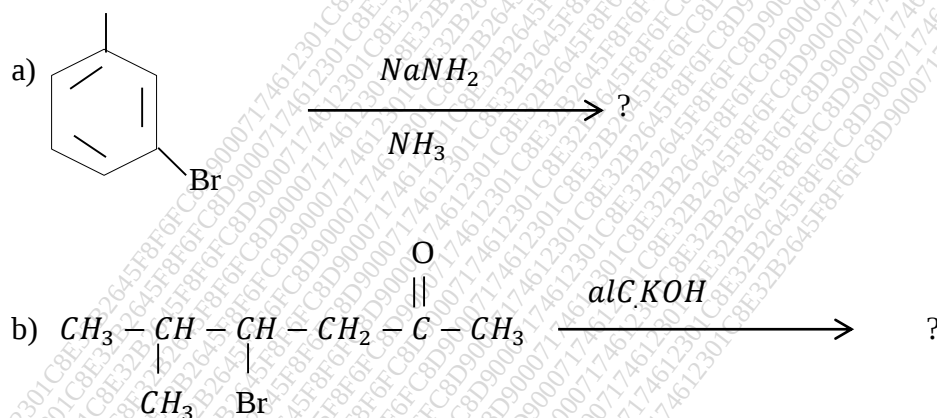
Q.6 Predict the product (s) with mechanism

12



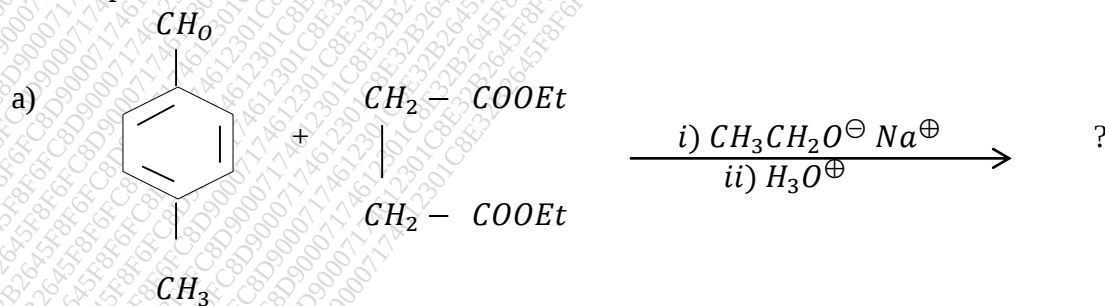
Q.7 Predict the product (s) with mechanism

12

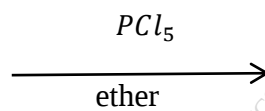
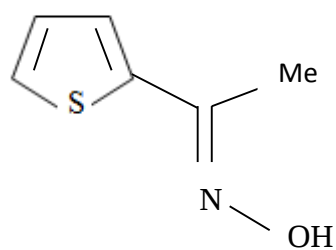


Q.8 Predict the product with mechanism

12



b)



?

SUBJECT CODE NO:- F-6228
FACULTY OF SCIENCE
M.Sc. (Sem III) Examination March/April 2018
Chemistry

Photochemistry, Free Radicals & Pericyclic Reactions – CHEO - 316

[Time: Three Hours]

[Max. Marks: 80]

N.B

Please check whether you have got the right question paper.

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

- Q.1 a) Choose the appropriate answer for the following
 i) Predict the type of following reaction

10



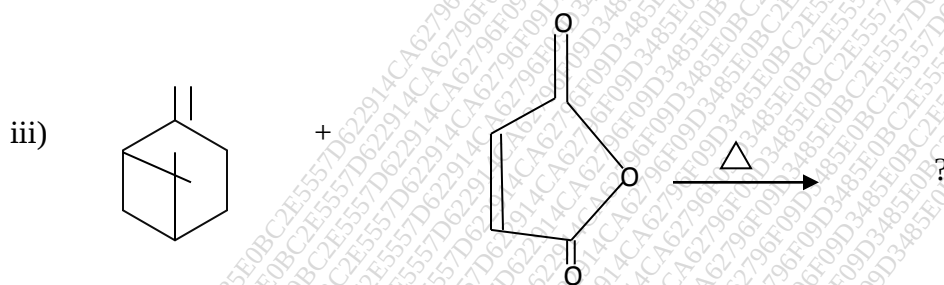
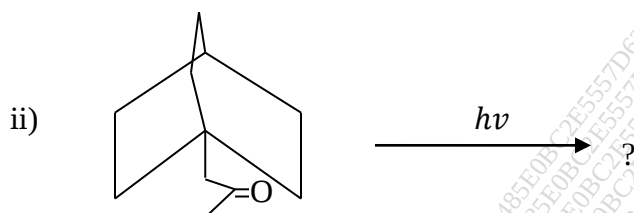
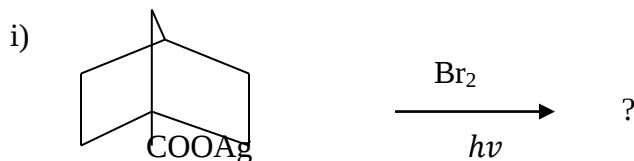
- a) Electrocyclic b) cycloaddition
 b) Sigma tropic d) None of the above.
- ii) Which of the following reaction converts 1,5-diene to isomeric 1,5-diene?
 a) Barton reaction b) cope rearrangement
 c) 1,3-sigmatropic reaction d) Diel's Alder reaction.
- iii) Which of the following transition is Lowest energy transition?
 a) $n \rightarrow \sigma^*$ b) $\pi \rightarrow \pi^*$
 c) $\sigma \rightarrow \sigma^*$ d) $n \rightarrow \pi^*$
- iv) Number of valence electron present around free radical atom are _____
 a) Six b) four c) seven d) Eight.
- v) [1,5] sigma tropic rearrangement reaction , superficial migration is _____
 a) Δ Symmetry allowed
 b) $h\nu$ symmetry allowed
 c) Both a & b
 d) Symmetry forbidden

- b) Explain the following terms
 i) persistent free radical
 ii) photoenolisation reaction

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c) Write the product(s) of following reaction

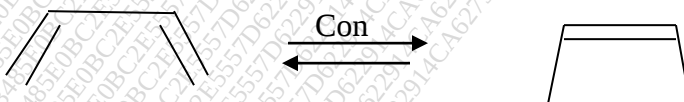
06



Q.2 Attempt the following

12

- i) With the help of frontier molecular orbital approach, explain whether following reaction is thermally or photochemically symmetry allowed process.



- ii) Explain paterno buchi reaction with proper example.

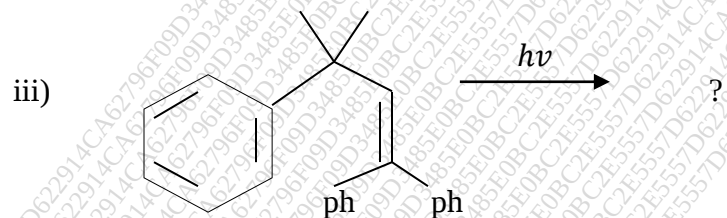
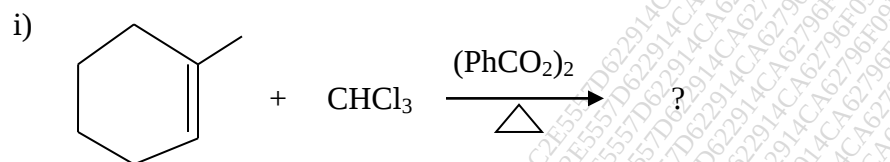
Q.3 Write a note on following

12

- i) Barton reaction
- ii) Sandmeyer's reaction

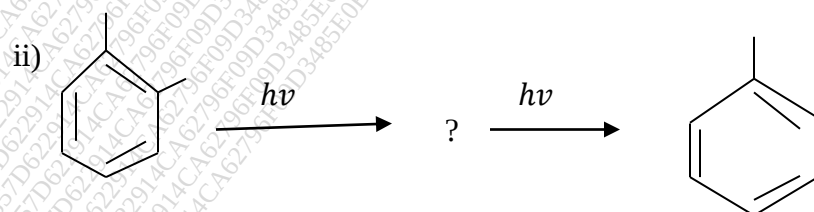
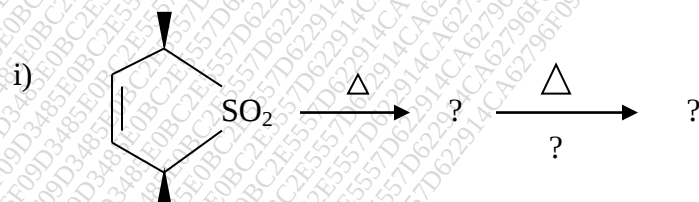
Q.4 Predict the product(s) with Mechanism

12



Q.5 Complete the following reactions with mechanism

12



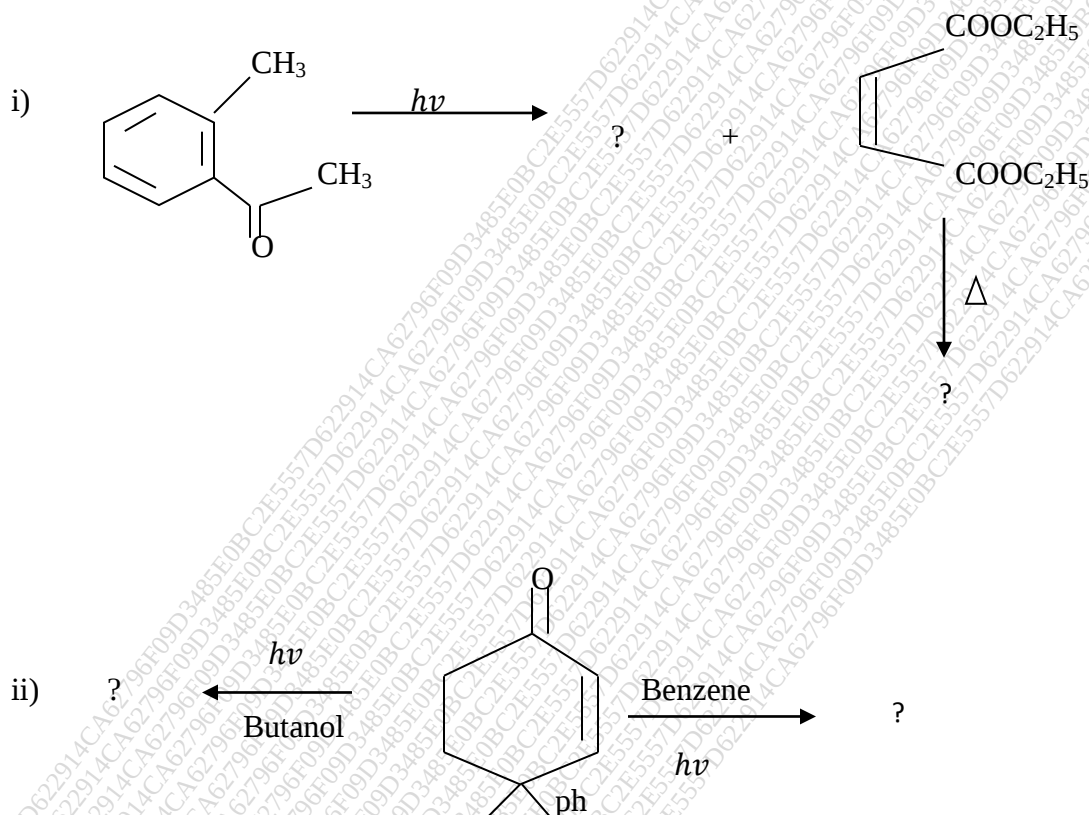
Q.6 Attempt the following

12

- Write all possible products form by cyclohexanone under photochemical condition
- By using Huckel –mobius orbital method predict whether $|2\pi^s + 2\pi^s|$ cycloaddition, thermally or photochemically symmetry allowed.

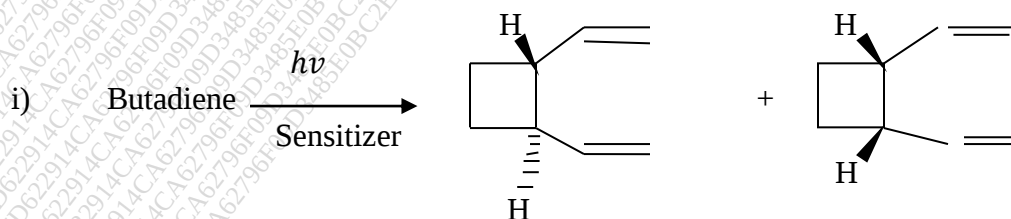
Q.7 Predict the product(s) with Mechanism

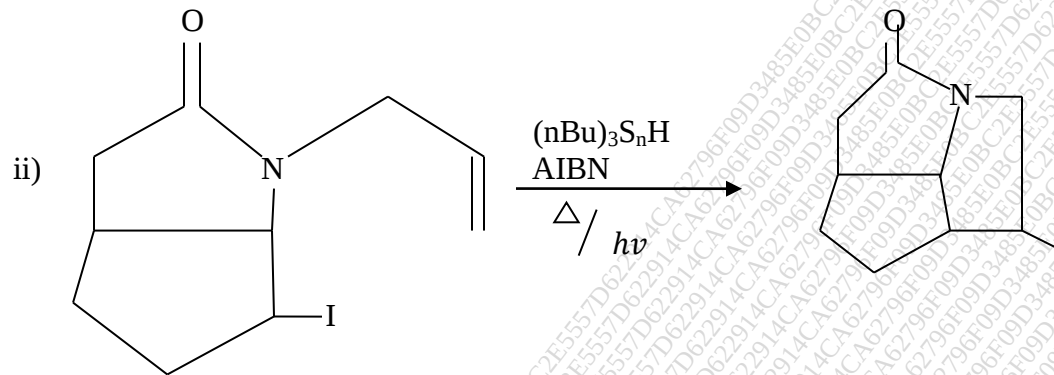
12



Q.8 Write the mechanism of following conversion

12





Total No. of Printed Pages:2

SUBJECT CODE NO:- F – 6213
FACULTY OF SCIENCE
M. Sc (Sem I) Examination March/April 2018
Chemistry
Physical Chemistry - CHE 104

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Question No.1 is compulsory.
- ii. Attempt any five questions from question no. 2 to 8.
- iii. Use of non-programmable calculator is allowed.

- Q.1 Answer all the 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 the ionic strength of 0.1m Barium chloride.
 - iii) Write a note on partial motor properties.
 - iv) Give the concept of fugacity.
 - v) Calculate the height to which liquid of density $0.88g.cm^{-3}$ will rise in capillary of radius 0.3cm (the surface tension of liquid is 26.5 dynes cm^{-1})
 - vi) What are surfactants? Give its types.
 - vii) Write a note on activity coefficient.
 - viii) Write a note on Debye – falkenHagen effect.
 - ix) Give the logarithmic equations of P^H and P^{OH} .
 - x) Write a note on buffer capacity.
- Q.2 06
- a) Derive the rate equation for absolute reaction theory.
 - b) Discuss the flash photolysis method to study kinetics of fast reactions. 06
- Q.3 06
- a) Derive Fermi – Dirac distribution Law.
 - b) How absolute entropies of solids ,liquids and gases are determined. 06
- Q.4 06
- a) Explain thermodynamics of micellization in terms of mass action model.
 - b) Derive Laplace equation and Kelvin equation. 06
- Q.5 06
- a) Derive Debye – Huckel limiting law.
 - b) Calculate the activity coefficient of Ca^{++} and Cl^- ions n 0.2m solution of calcium chloride. 06
- Q.6 06
- a) Derive an expression for dissociation constant of complex ion.
 - b) Explain in brief salt effect and solubility product. Give its applications. 06

2018

- Q.7 a) Discuss the influence of solvent in terms of single sphere model. 06
b) Explain vibrational partition function. 06
- Q.8 a) State and explain Debye – Huckel theory of strong electrolyte. 06
b) What is CMC? Discuss the factors affecting to CMC? 06

Total No. of Printed Pages:04

SUBJECT CODE NO:- F-6106
FACULTY OF SCIENCE
M.Sc (Sem IV) Examination March/April 2018
Chemistry
Medicinal Chemistry -CHEO-420

[Time: Three Hours]

[Max.Marks: 80]

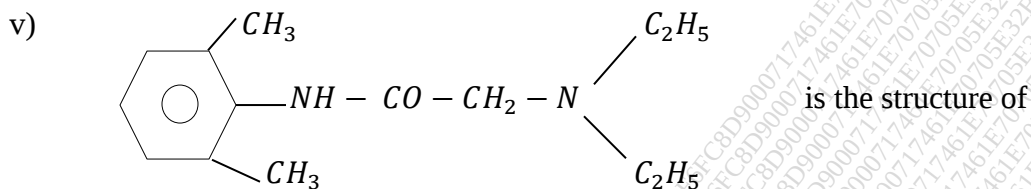
Please check whether you have got the right question paper.

N.B

- i) Q.No. 1 is compulsory.
- ii) Attempt any five questions from Q.No.2 to Q.No.8
- iii) Figures to the right indicate full marks

Q.1 Choose the correct option from the following questions:- 20

- i) One of the following is bioisoster for carboxylic acid
 - a) Tetrazole
 - b) Carboxyl
 - c) Amides
 - d) Esters
- ii) Irreversible interaction of an antagonist with a receptor is due to
 - a) Ionic bonds
 - b) Hydrogen bonds
 - c) Covalent bonds
 - d) All of the above
- iii) The term "biotransformation" includes the following
 - a) Accumulation of substance in a fat tissue
 - b) Accumulation of substance in a tissue
 - c) Process of physicochemical and biochemical alteration of drug
 - d) All of the above
- iv) Drugs that reduces swelling are called
 - a) Anti-Hemorrhoid drugs
 - b) Antibiotics
 - c) Anti-acne drugs
 - d) Antiseptics



- a) Ketamine
- b) Fluorouracil
- c) Lidocaine
- d) Cis-platin

vi) Which of the class of drug used on mental disorder

- a) Antineoplastic
- b) Antiseptic
- c) Analgesic
- d) Tranquillisers

vii) Which of the theory assumes that substrate plays role in determining the final shape of enzyme?

- a) Rate theory
- b) Occupancy theory
- c) Induced fit theory
- d) None – of the above

viii) Metabolic transformation (Phase –I) is

- a) Acetylation and methylation of substance
- b) Transformation of substance due to oxidation, reduction or hydrolysis
- c) Binding to plasma proteins.
- d) All of the above

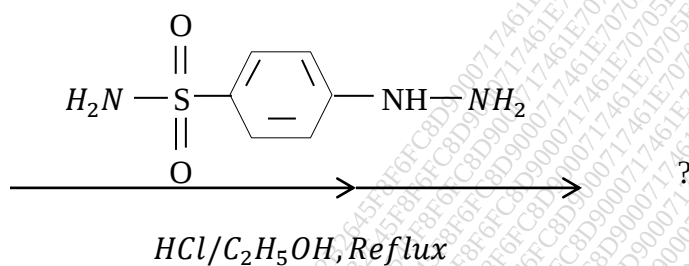
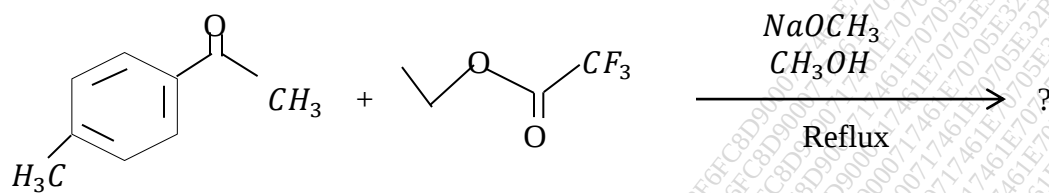
ix) Which of the following drug is alkylating agent

- a) Procain
- b) Chlorambucil
- c) Ibuprofen
- d) Atenolol

x) A ratio used to evaluate the safety and usefulness of drug for indication is called

- a) Lethal dose
- b) Tolerance
- c) Therapeutic index
- d) Sensibilization

- Q.2 Attempt the following questions 12
- Explain the following terms
 - Receptors
 - ED_{50} and LD_{50}
 - Antimetabolite
 - Draw the structure of following drugs and give its clinical significance.
 - Phenobarbital
 - Sulfamethoxazole
 - Tolbutamide
- Q.3 Attempt the following questions 12
- What is Pharmacokinetics? Explain its importance in drug designing
 - Write a note on antibiotics with example.
- Q.4 Attempt the following questions 12
- Explain occupancy theory related to drug activity.
 - Discuss Phase-II metabolic reactions of drugs.
- Q.5 Explain important steps involve in synthesis of following 12
- Cefepime
 - D-Sotalol
 - Naproxen
- Q.6 Write a note on 12
- Membrane active drugs
 - Hard and soft drugs
- Q.7 Solve the following questions 12
- Explain SAR and QSAR
 - Discuss bioavailability in detail
- Q.8 Attempt the following questions. 12
- Give the classification of drugs on the basis of their chemical structure.
 - Complete the following reaction sequence



Total No. of Printed Pages:04

SUBJECT CODE NO:- F-6078
FACULTY OF SCIENCE
M. Sc. (Sem IV) Examination March/April 2018
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

- i) Q.1 is compulsory
- ii) Attempt any five questions from Q.2 to Q.8
- iii) Figure to right indicate full marks.

Section A

Q.1 Select the correct alternative from the following 20

- 1) In general the aldehyde functional group is _____ with respect to methylene group of the main chain.
 - a. Cis
 - b. Trans
 - c. Enolic
 - d. Both a and b
- 2) Theoretically , how many optically active isomers are possible in menthol
 - a. Two
 - b. Four
 - c. Six
 - d. Eight
- 3) Abietic acid is _____
 - a. Tricyclic diterpenoids
 - b. Acyclic diterpenoids
 - c. Monocyclic diterpenoids
 - d. Bicyclic diterpenoids
- 4) How many isoprene units are present in carotenoids
 - a. 6
 - b. 7
 - c. 8
 - d. 9
- 5) Steroids are the compounds which gives _____ when distilled with selenium at 420°C.
 - a. Carotenoids
 - b. Sesquiterpenoids
 - c. Diels hydrocarbon
 - d. none of the above

vi) Phytol contains _____ chiral centres.

- a. 1
- b. 2
- c. 3
- d. 4

vii) Quercetin is a _____ Flavone

- a. Trihydroxy
- b. Tetrahydroxy
- c. Pentahydroxy
- d. Hexahydroxy

viii) Quinine is used as-----.

- a. Antibiotic
- b. Antifungal
- c. Antiseptic
- d. Antimalarial

ix) Geraniol and nerol are _____ of each other.

- a. Tautomers
- b. Functional group isomers
- c. Geometrical isomers
- d. Stereoisomers

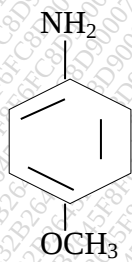
x) Bile acids occurs in bile which is the secretion of _____

- a. Liver
- b. Pancreas
- c. Lungs
- d. Kidney

Section B

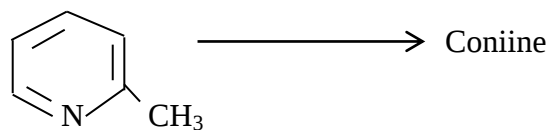
Q.2 Provide an appropriate synthetic route for the following

i)

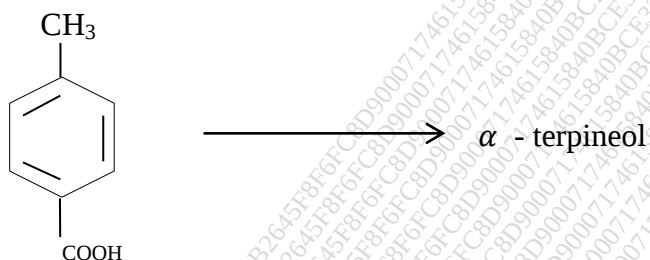


Quinic acid

ii)



iii)



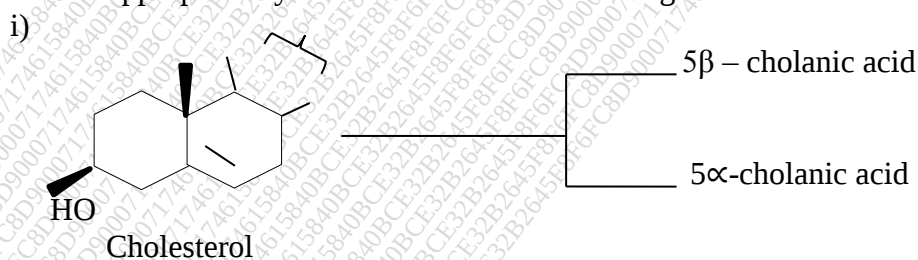
Q.3 Explain the following 12

- Diels hydrocarbon
- Baker- venkataraman synthesis of flavones
- Classification of terpenoids

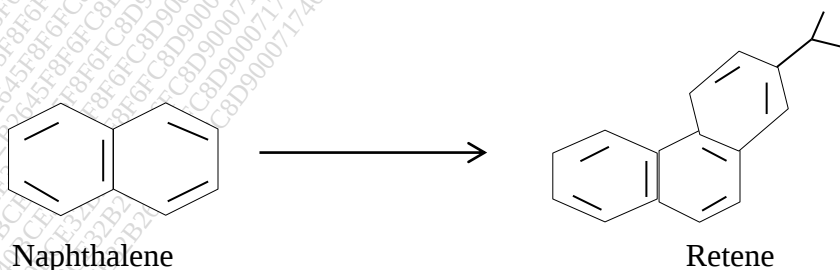
Q.4 Solve the following 12

- Explain the synthesis of testosterone from cholesterol
- Depict the structure showing the stereochemical features of the following molecules-
a)menthol b)morphine c) Quinine

Q.5 Provide an appropriate synthetic route for the following conversion. 12



ii)



- Q.6 Write short note on following 12
- Hofmann's exhaustive methylation of alkaloids
 - Explain isoprene and special isoprene rule in terpenoids
 - Cyanidin chloride
- Q.7 Answer the following 12
- Discuss the structure and oxidation products of zingiberene.
 - Establish the structure of nicotine and describe its synthesis
 - Why neo-menthyl chloride undergoes faster elimination than menthyl chloride
When both treated with sodium ethoxide under same condition?
- Q.8 Answer the following 12
- Describe the synthesis and stereochemistry of ephedrine
 - Describe the synthesis of β -carotene

Total No. of Printed Pages:2

SUBJECT CODE NO:- F-6091
FACULTY OF SCIENCE
M.Sc. (Sem II) Examination March/April 2018
Chemistry
Physical Chemistry - CHE 208

[Time: Three Hours]

[Max. Marks: 80]

N.B

Please check whether you have got the right question paper.

- i) Question No.1 is compulsory
- ii) Attempt any five questions from question No.2 to 8.
- iii) Figure to the right indicate full marks
- iv) Use a non-programmable calculator is allowed.

- Q.1 Answer all the questions given below. 20
- i) Draw wave and probability function for a particle in one dimensional box.
 - ii) Write a quantum mechanical definition of angular momentum.
 - iii) Give a secular determinant for benzene molecule.
 - iv) Determine atomic term symbol for a system with $L=3$ and $S=1$
 - v) Calculate degree of freedom in the following system.
 - a). $\text{Fe}_{(s)} + \text{H}_2\text{O}_{(l)} \rightleftharpoons \text{FeO}_{(s)} + \text{H}_{2(g)}$
 - b). saturated solution of sugar
 - vi) Write a note on triple point.
 - vii) A type atoms are present at the corners and B type at the face centre of unit cell. Determine the formula of the compound if one of the A type atom is missing from the corner of unit cell.
 - viii) Determine the miller indices of the crystal planes which cuts through the crystal axis at $2a:3b:c$ and $-a:b:Dc$
 - ix) Draw Jablonski diagram.
 - x) State and explain Franck –condon principle.
- Q.2 06
- a) Derive an expression for a particle in cubical box.
 - b) Calculate energy change when an electron jumps from first to the third energy state confined in one dimensional box of width $2A^\circ$.

2018

- Q.3 a) Discuss perturbation method and give its application to helium atom. 06
- b) Determine delocalized energy for cyclobutadiene molecule 06
- Q.4 a) Draw and explain the phase diagram of two component system forming eutectic mixture 06
- b) The specific volumes of solid and liquid at 273°K are $19.3 \times 10^{-6} \text{ m}^3$ and $18.5 \times 10^{-6} \text{ m}^3$ respectively. Calculate change in melting point of solid per atmosphere increase of pressure. (Heat of fusion of solid is 79.8 cal gm^{-1}) 06
- Q.5 a) Calculate the radius ratio for six and eight co-ordinate structure 06
- b) The unit cell of silver contains two atoms. Calculate density of silver if its unit cell length is $3\text{\AA}$. 06
- Q.6 a) Explain the mechanism of fluorescence and phosphorescence with suitable diagram. 06
- b) Discuss excimer and exciplex. 06
- Q.7 a) Show that: $[L^2 L_z] = 0$ 06
- b) What are ladder operators? Show that they commute with square of angular momentum. 06
- Q.8 a) State law of Symmetry and explain different elements of symmetry operations. 06
- b) Discuss the phase diagram of three component system with two pairs of partially miscible liquids 06

N.B

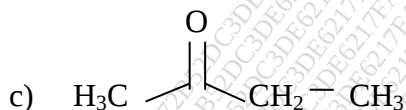
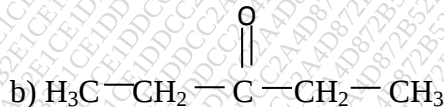
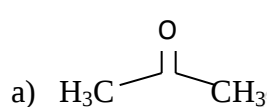
Please check whether you have got the right question paper.

- Question no.1 is compulsory.
- Attempt any five questions from Q. 2 to Q.8.
- Figures to the right indicate full marks.

Q.1 Choose the correct alternative for the following.

20

- 1) Only one signal is present in the PMR spectra of.



- 2) ^1H , ^{13}C , ^{19}F , ^{31}P have nuclear spin equal to

a) $1/2$

b) 1

c) 0

d) $3/2$

- 3) Distance between the centers of the peaks of doublet is called

a) Coupling constant

b) Spin constant

c) Spin-Spin constant

d) None

- 4) The PMR spectra of CH_4 , C_2H_6 and C_6H_6 exhibit.

a) Singlet

b) Doublet

b) Triplet

d) Quintet

- 5) ^{13}C spectroscopy

a) Are spin decoupled

b) Are noise decoupled

b) Appear as a sharp singlet

d) All are correct

- 6) In proton decoupling ^{13}C MR spectra P- Xylene exhibit signal

a) 3

b) 4

c) 5

d) 6

- 7) β - cleavage of bond with V-H rearrangement to form a cation and neutral molecules.
 a) Mchafferty Rearrangement b) Retro-Diels-Alder Reaction
 c)H- transfer Rearrangement d) Skeletal Rearrangement
- 8) Electron spin resonance was discovered by
 a) Zavoisky b) Block
 c) Purcell d) Anderson
- 9) For two equivalent protons , the number of lines are
 a) $2n$ b) $2nI$
 c) $2nI + 1$ d) $2n^2$
- 10) In ^{119}Sn Halides.
 a) A linear correlation between Isomer shift and electronegativity is found.
 b) Isomer shift increases with increasing electronegativity.
 c) Sn is SP^3 Hybridized
 d) All statements correct.

Q.2 Write a short note on following 12
 A. Retro Diels –Alder
 B. AMX spin pattern
 C. Factor affecting on 'g' value

Q.3 Deduce the structure from the given m.f. and spectral data. 12

1) M.F $\text{C}_{10}\text{H}_{12}\text{O}$
 IR = $1715, 1600 \text{ cm}^{-1}$
 PMR = $\delta 7.4(\text{S}, 5\text{H})$
 $= \delta 2.1(\text{sept}, 1\text{H})$
 $= \delta 1.2(\text{d}, 6\text{H})$

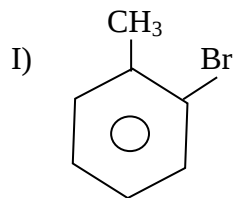
2) M.F. $\text{C}_7\text{H}_8\text{O}$
 IR = $1600, 1100 \text{ cm}^{-1}$
 PMR = $\delta 7.5(\text{S}, 5\text{H})$
 $= \delta 3.5(\text{S}, 3\text{H})$

3) M.F $\text{C}_2\text{H}_5\text{Br}$
 IR = $2915, 750 \text{ cm}^{-1}$
 PMR = $\delta 3.2(\text{q}, 2\text{H})$
 $= \delta 1.5(\text{t}, 3\text{H})$

Q.4 Solve the following

12

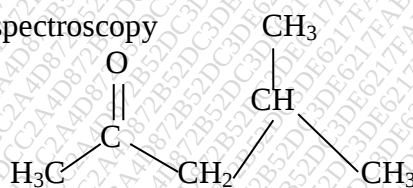
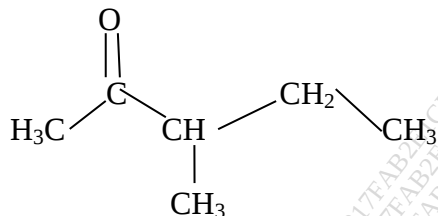
A) Distinguish the following Compound by ^1H NMR



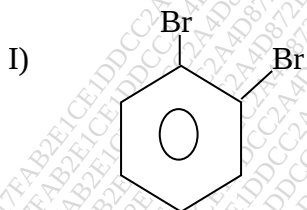
II)



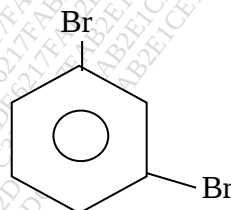
B) How will you distinguish by mass spectroscopy



C) How could the following pair of Isomeric compounds be differentiated by ^{13}C NMR spectroscopy.



II)



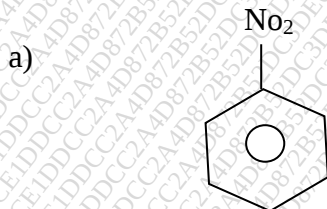
Q.5 Explain with one example

12

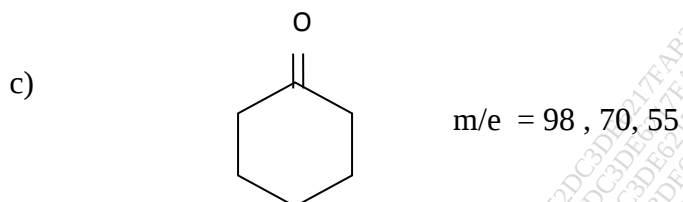
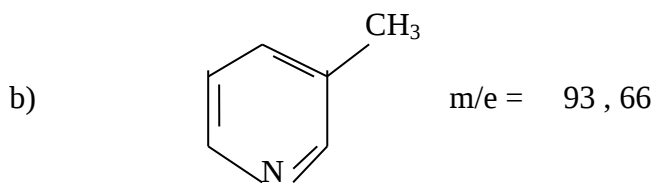
- A) Chemical shift Reagents
- B) Quadrupole splitting
- C) Base peak and metastable peak

Q.6 Explain the genesis of the ion

12



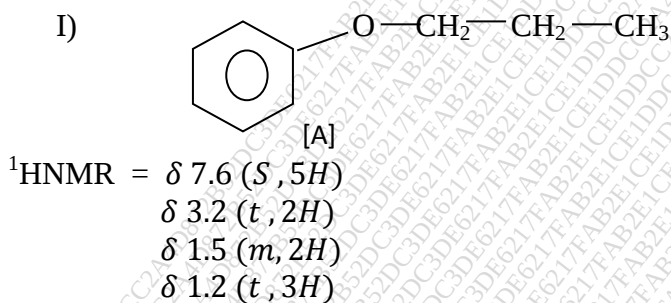
$m/e = 123, 93, 77, 51$



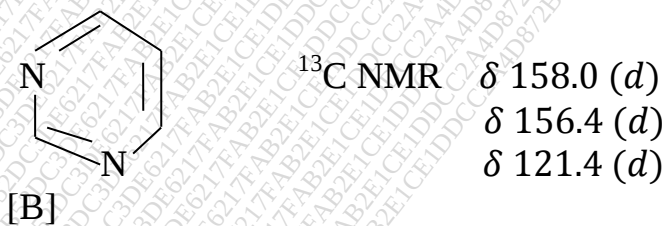
Q.7 Solve the following

12

A) Assign the given ^1H NMR chemical shift value to the compound (A)



B) Assign the given ^{13}C NMR chemical shift value to compound (B)



Q.8 Answer the following

12

- 1) Explain the principle of Mossbauer spectroscopy
- 2) Applications of Electron spin Resonance spectroscopy

SUBJECT CODE NO:- F_6047
FACULTY OF SCIENCE
M.Sc.(Sem IV) Examination March/April 2018
ORGANIC CHEMISTRY
Advanced Organic and Heterocyclic Chemistry-CHEO-418

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

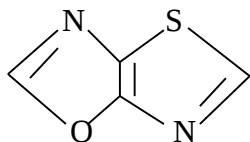
N.B

- i) Question number one is compulsory.
- ii) Attempt any five questions from Q.2 to Q.8
- iii) Figure to right indicate full marks

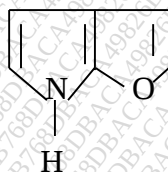
Q.1 A) Give the IUPAC nomenclature of following compounds

10

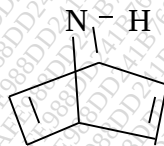
i)



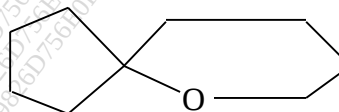
ii)



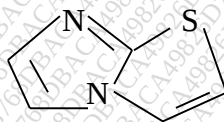
ii)



iv)

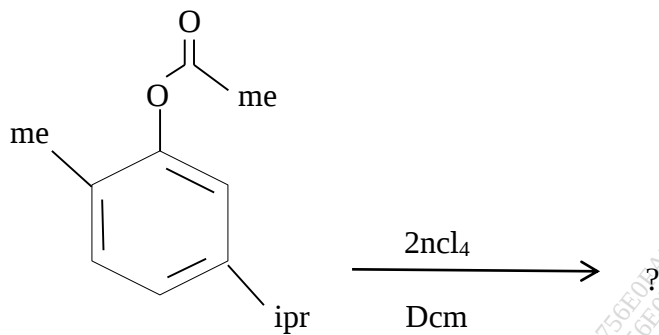


v)

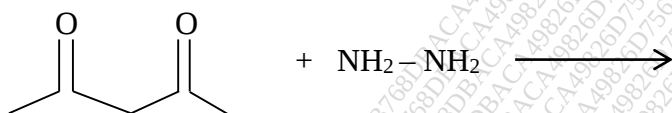


B) predict the product

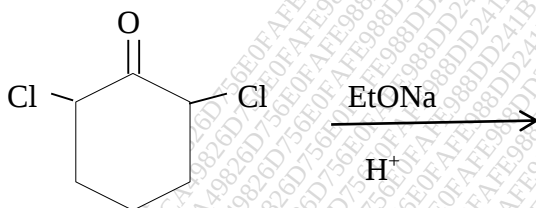
i)



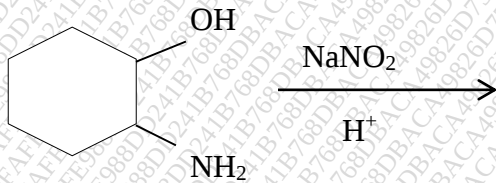
ii)



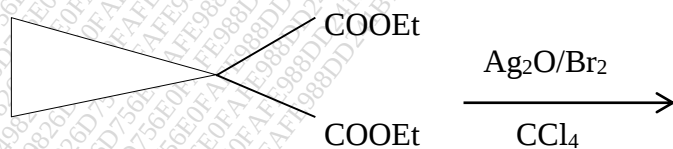
iii)



iv)



v)



Q.2 Write short note on the following

i)

Anchimeric assistance

ii)

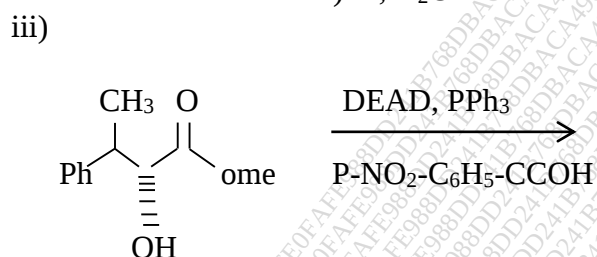
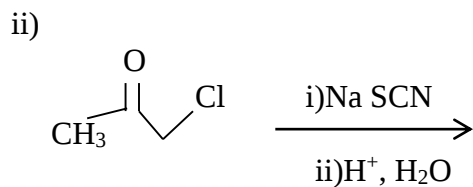
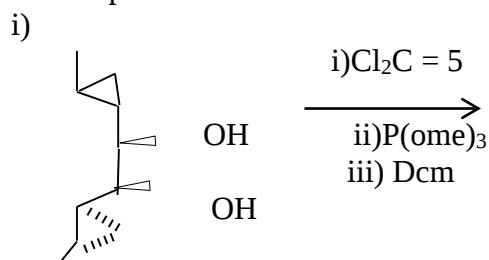
Skraup quinoline synthesis

iii)

Mcmurry coupling reaction

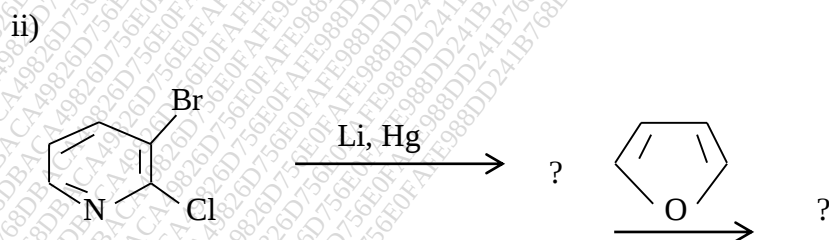
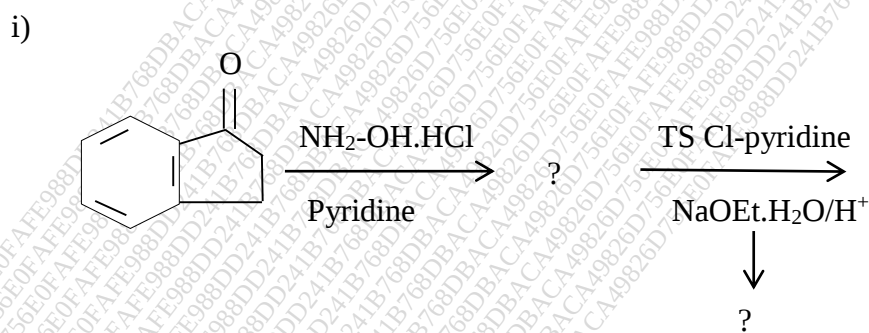
Q.3 Predict the product with mechanism

12

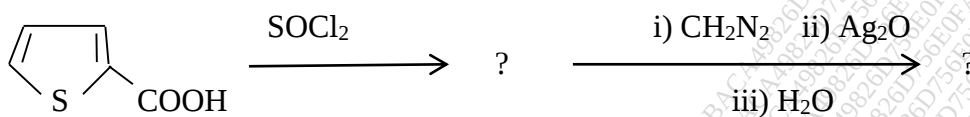


Q.4 Complete the following reaction sequence with mechanism

12



III)



Q.5 Explain the following

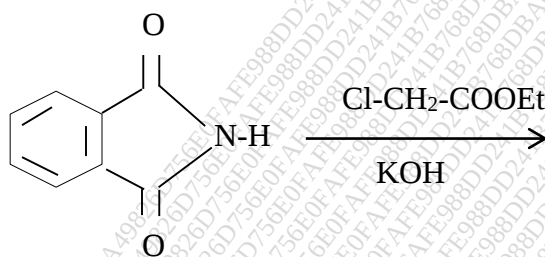
- i) Explain ^1H NMR spectrum of following heterocyclic compounds
 - a) Pyridine
 - b) Pyrimidine
- ii) Why pyrazole is a weak base than imidazole
- iii) What is β -Lactams? Give any one method of its synthesis

12

Q.6

12

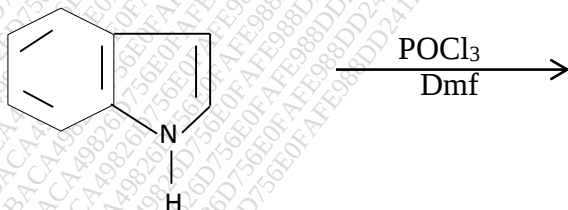
i)



ii)

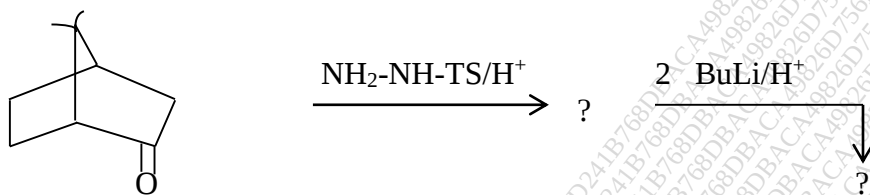


iii)



Q.7 Complete the following reaction sequence with mechanism.

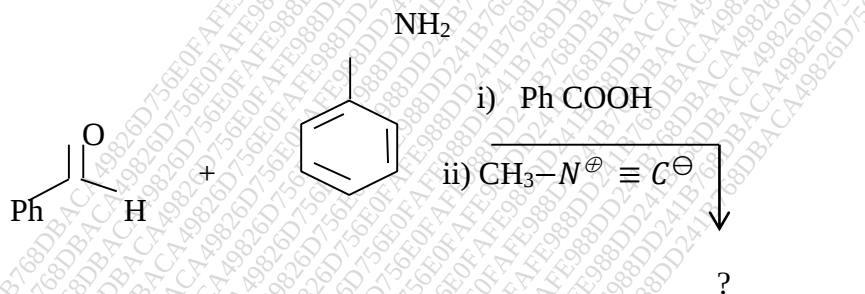
i)



ii)



iii)



Q.8 Explain the following

- i) Stille-coupling
- ii) Suzuki-coupling
- iii) Write note on Baylis- Hillmann reaction

2018