

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

M.A./M.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2016

FIRST YEAR [BATCH 2016-18]

APPLIED CHEMISTRY

Date : 16/12/2016

Time : 11 am – 1 pm

Paper : II

Full Marks : 50

(Use Separate Answer Script for each Group)

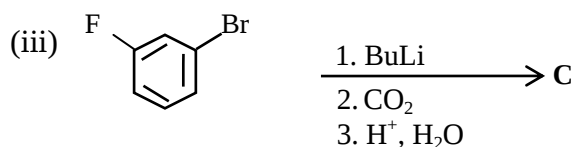
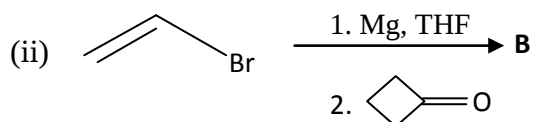
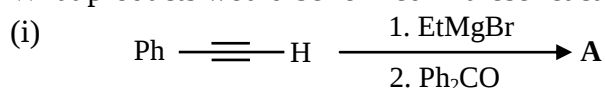
Group-A

Answer any one question from Question No. 1 & 2 :

[1×20]

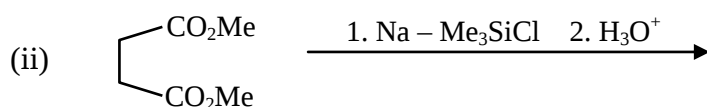
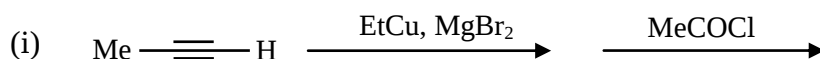
1. a) What products would be formed in these reactions?

[2×3]



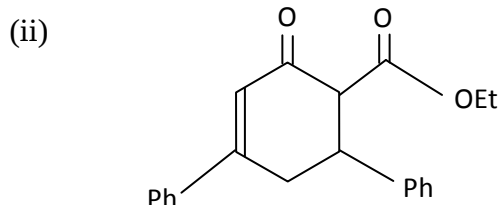
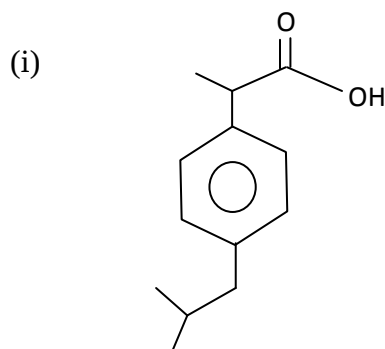
b) Write the product(s) of following reactions with explanation.

[2+2]



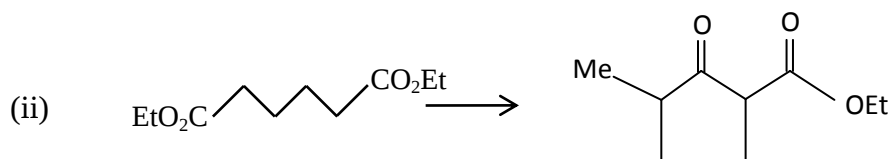
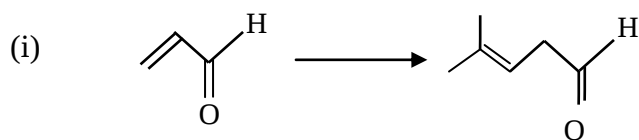
c) Describe the synthesis of the following compounds with proper retrosynthetic analysis.

[3×2]



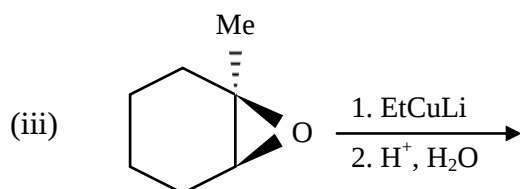
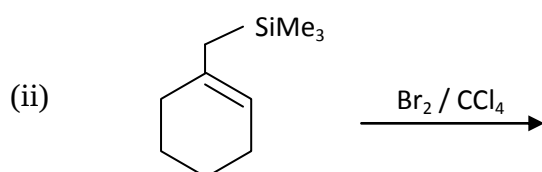
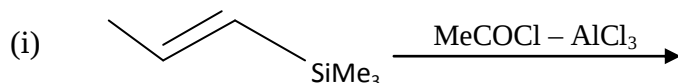
d) Carry out the following conversions:

[2x2]



2. a) What products would you expect from the following reactions:

[2x3]

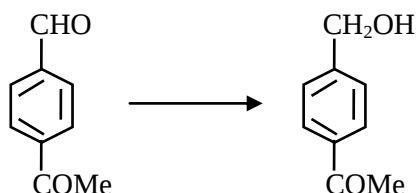


b) Prepare $\text{PhC}(\text{CH}_3)=\text{CH}_2$ using PhMgBr and other necessary compound.

[2]

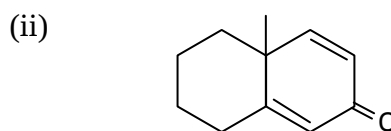
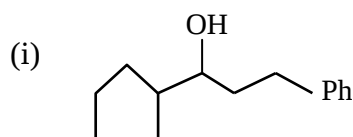
c) Carry out the following conversion.

[2]



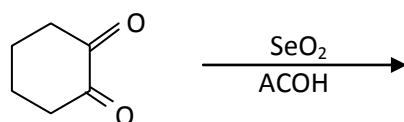
d) Give retrosynthetic analysis and one efficient synthesis of each of the following compounds:

[3x2]



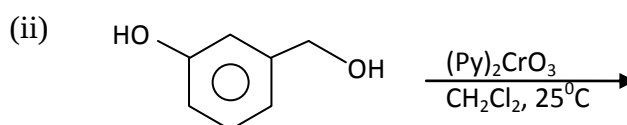
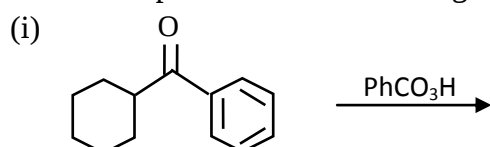
e) Predict the product of the following reaction. Give mechanism.

[2]



f) Predict the product of the following reactions:

[2]

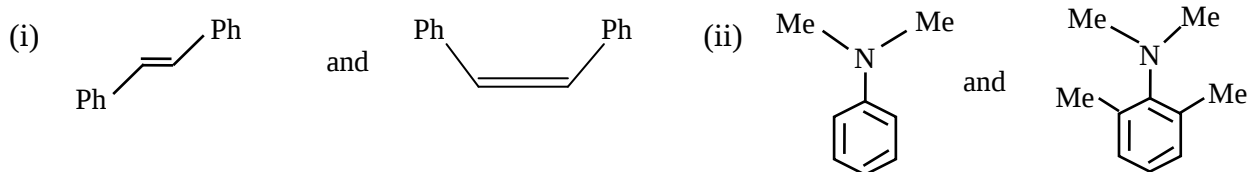


Group-B

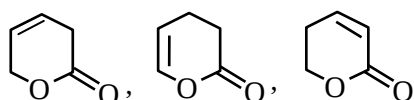
Answer any one question from Question No. 3 & 4 :

[1×15]

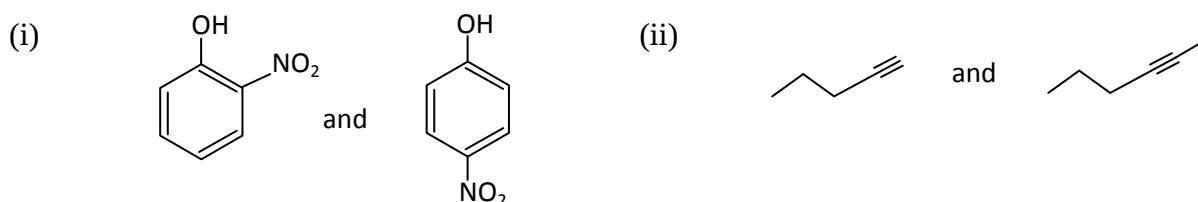
3. a) Define 'chromophore' and 'auxochrome' in UV spectroscopy. [2]
b) How would you distinguish the following pair using UV spectroscopy. [2]



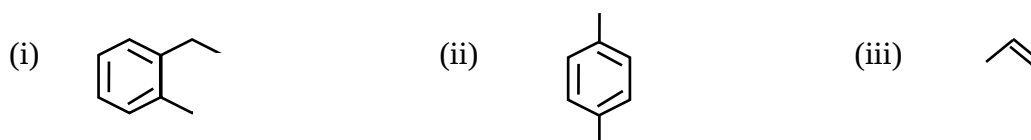
- c) How can you differentiate intramolecular and intermolecular hydrogen bonding using IR spectroscopy? [2]
d) Arrange the following compounds in order of increasing stretching carbonyl frequency with proper explanation. [2]



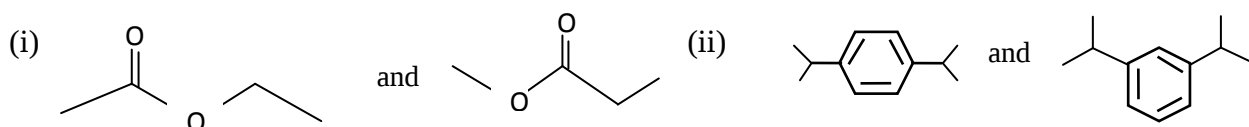
- e) What do you mean by chemical shift (δ) in nmr spectroscopy? [2]
g) In a nmr spectra, δ values of a doublet appear at 7.15 ppm and 7.13 ppm respectively. Calculate the coupling constant value. Spectra is recorded at 400 MHz nmr machine. [2]
h) What is meaning of 'base peak' in mass spectroscopy? [1]
i) Ethylbenzene in mass spectrometry gives prominent peak at m/z 91. Explain. [2]
4. a) Arrange the different types of transition in UV spectroscopy in order of decreasing energy. Which one of them is symmetrically forbidden? [2]
b) Distinguish the following pair by IR spectroscopy. [2]



- c) Why tetramethylsilane is used as standard in nmr spectroscopy? [2]
d) How many ^1H NMR signals (not peaks) would you predict for each of the following compounds? [3]



- e) Explain in detail how you would distinguish between the following set of compound using nmr spectroscopy. [3]



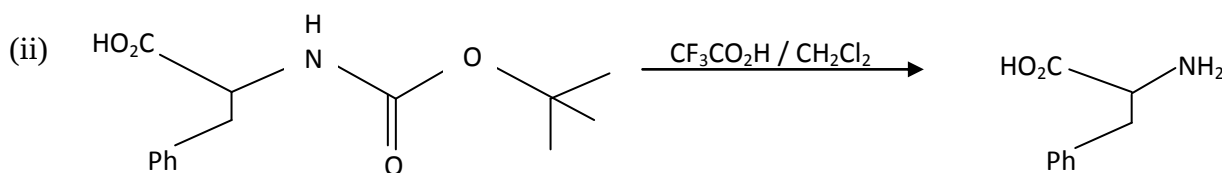
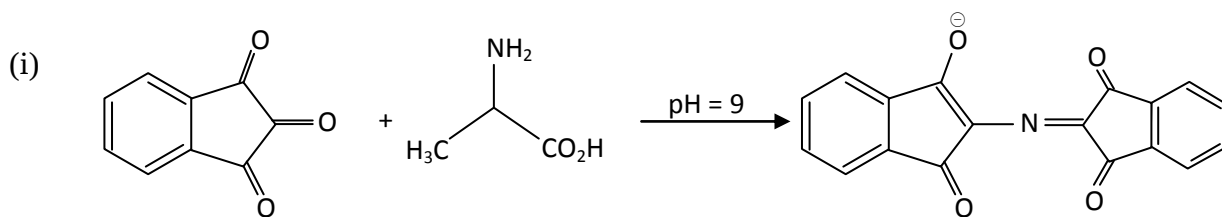
- f) The mass spectrum of CH_3F gives three peaks at m/z 34, m/z 33 and m/z 15. Propose an explanation of the formation of above peaks. [3]

Group-C

Answer any one question from Question No. 5 & 6 :

[1×15]

5. a) Write the name and structure of an optically inactive naturally occurring amino acid. [1]
b) Draw the Fischer projection formula of D-alanine. [1]
c) Discuss the synthesis of a dipeptide alanylglycine using Merrifield solid phase protocol. [4]
d) What do you mean by denaturation of protein? [2]
e) What is the difference between primary and secondary structure of protein? [2]
f) Convert: (i) D-(+)-glucose to D-(-)-Fructose (ii) D-Arabinose to D-Glucose [2]
g) On treatment with MeOH/HCl to glucose why only anomeric OH is converted to OMe – Explain. [1]
h) Glucose and Fructose give same osazone – Justify your answer. [2]
6. a) Complete the synthesis of following amino acids. [2+2]
(i) Phenyl alanine from benzaldehyde (using Erlenmeyer azalactone method).
(ii) Alanine from acetaldehyde (using Strecker method).
b) Write the name of any reagent for end group determination of peptide and also discuss the method shortly. [2]
c) What is isoelectric pH? [1]
d) Write the mechanism of the following reactions. [2+1]



- e) α -D-glucopyranose undergoes mutarotation but α -D-methylglucopyranoside does not – Explain. [1]
f) α -anomeric form of D-glucose is more stable than β -anomeric form while the reverse will happen in case of methylglucopyranoside – Explain. [2]
g) Write down the products formed when D-glucose reacts with acetone and benzaldehyde. [2]

_____ × _____