

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, DECEMBER 2016

THIRD YEAR [BATCH 2014-17]

CHEMISTRY [Honours]

Paper : V [Group-B]

Date : 19/12/2016

Time : 11 am –1 pm

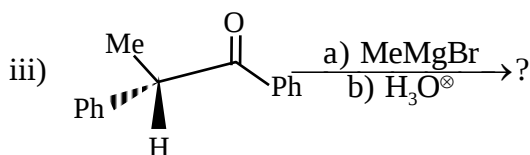
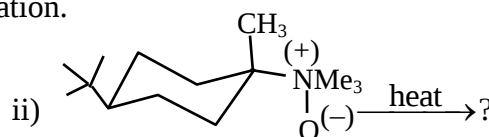
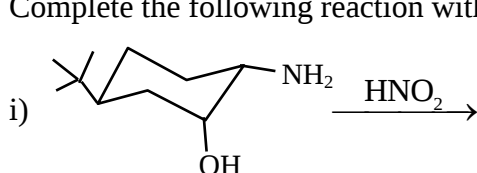
Full Marks : 50

[Attempt one question from each Unit]

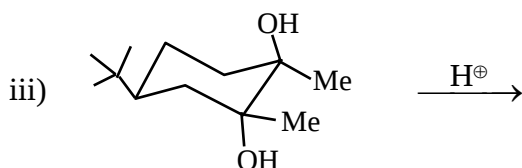
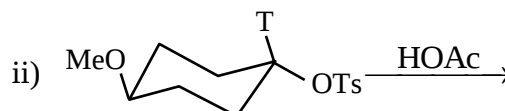
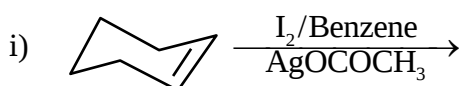
Unit – I

[12 marks]

1. a) Draw the preferred conformation of 1-methyl-1-phenyl cyclohexane and justify your answer. [2]
- b) Indicate the symmetry elements present in boat conformer of cyclohexane. [1]
- c) Explain the effect of heat on the diastereomers of 4-hydroxycyclohexane carboxylic acid. [2]
- d) Complete the following reaction with proper explanation. [3×2]



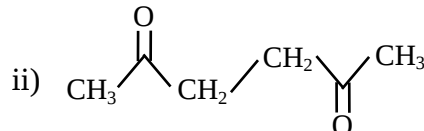
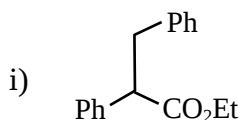
- e) Draw the most stable conformation of trans-1, 3-ditertiarybutylcyclohexane. [1]
2. a) Comment on the optical activity of *cis*-1, 2-dimethylcyclohexane. [2]
 - b) Explain the following observations : [2]
Cyclohexane *cis*-1, 2-diol is cleaved by lead tetraacetate about 22 times faster than its *trans*-isomer.
 - c) Predict the product(s) in each of the following reactions with plausible mechanism in each case. [3+3+2]



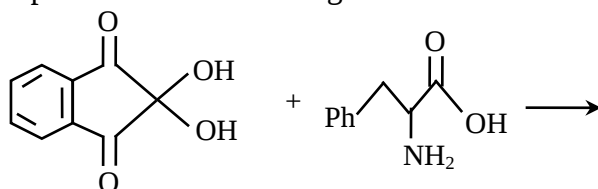
Unit – II

[13 marks]

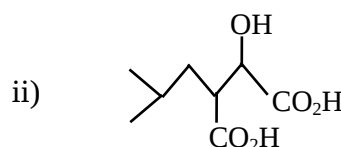
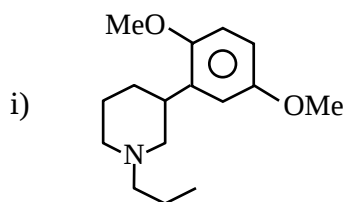
3. a) Give retrosynthetic analysis and an efficient synthesis of the following compounds : [3+3]



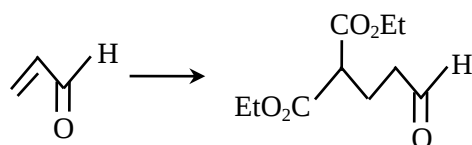
- b) Isoelectric point of glycine is 6.0 but that of aspartic acid it is 3.0. Explain. [2]
- c) Describe the synthesis of tyrosine applying Erlenmeyer azlactone synthesis. [2]
- d) Predict the product of the following reaction. Give mechanism. [3]



4. a) During deprotection of benzyloxycarbonyl group from a. N-protected peptide, usually additives like anisole or dimethyl sulphide is used. Explain the role of these additives. [2]
 b) Synthesise Ala-Phe-Gly using solid phase peptide synthesis method. [3]
 c) Outline the total synthesis of the following compounds showing retrosynthetic analysis. [2×3]



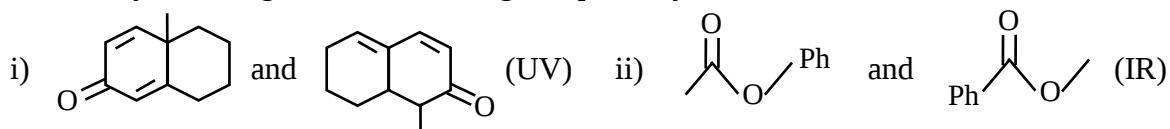
- d) Carry out the following conversion : [2]



Unit – III

[12 marks]

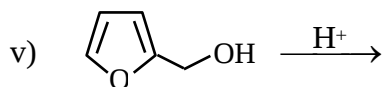
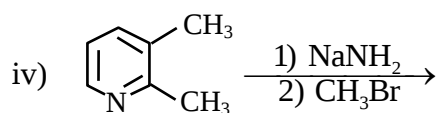
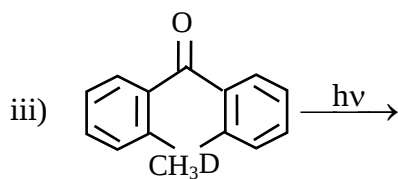
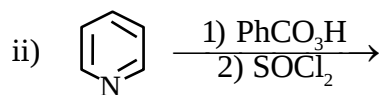
5. a) Which of the following is/are NMR active? Give reason. ^{14}N , ^{12}C , ^{31}P , ^{17}O . [2]
 b) An aqueous solution of *p*-nitrophenol exhibits peak at λ_{max} 317nm. Explain what change in peak position is expected if the above solution is made alkaline. [2]
 c) How would you distinguish between the members of the following pairs of compounds? (**any two**) [2+2]
 i) δ -lactone and γ -lactone (by IR)
 ii) *O*-dichlorobenzene and *p*-dichlorobenzene (by PMR)
 iii) Meso and *dl*-butane-2, 3-diol (by IR)
 d) Explain the following observations : [2]
 2-Hydroxy-5-nitroacetophenone shows two carbonyl stretching frequencies at 1692 and 1658 cm^{-1} .
 e) The $n \rightarrow \pi^*$ transition in UV is a forbidden transition. Suggest reason for forbiddenness. [2]
6. a) Why is TMS used as reference compound for ^1H NMR spectrum? [2]
 b) The UV spectrum of methyl vinyl ketone shows λ_{max} at 219 nm and 324 nm. Using the principle of solvent dependence of λ_{max} value, how can you determine which peak is due to $\pi \rightarrow \pi^*$ transition and which is due to $n \rightarrow \pi^*$ transition? [3]
 c) A compound having molecular formula $\text{C}_8\text{H}_8\text{O}_2$ shows strong absorption at 1700 cm^{-1} in IR and ^1H NMR shows the following signals : δ 9.9(1H, S), δ 7.8(2H, D, J = 8Hz), δ 7.2(2H, D, J = 8Hz) and δ 3.9(3H, S) Deduce the structure. [3]
 d) How can you distinguish between the given pairs, by— [2+2]



Unit – IV

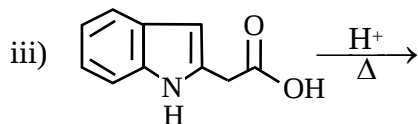
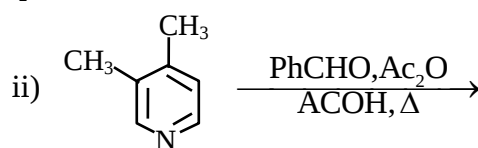
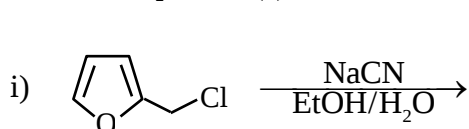
[13 marks]

7. a) Explain the following statements : [2+2]
 i) Furan is an enol ether.
 ii) Pyrrole undergoes electrophilic substitution faster than furan.
 b) Explain why 9,10-positions of anthracene are more susceptible to electrophilic attack. [2]
 c) Explain why pyrrole-2-aldehyde does not undergo benzoin condensation but does so when mixed with furfural. [2]
 d) Predict the product of the following reactions. [5×1]



8. a) Outline the Bardhan-Sengupta synthesis of phenanthrene. [3]

b) Predict the product(s) of the following reactions with plausible mechanism. [3×2]



c) Write down the synthesis of chloroquine and mention one use of it. [3+1]

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