

UG Even Semester (CBCS) Exam., May—2017

CHEMISTRY

( Honours )

( 8th Semester )

Course No. : BSCH-801

( Organic Chemistry )

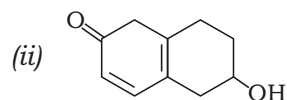
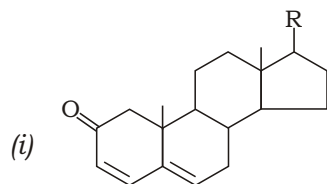
Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks  
for the questions

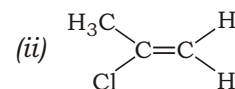
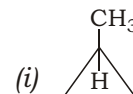
1. (a) Define chromophore and auxochrome with suitable examples. 3
- (b) Calculate the  $\lambda_{\max}$  of the following using Woodward rules :  $2 \times 2 = 4$



- (c) What happens on absorption of infrared and UV radiation by a molecule? 3

**OR**

2. (a) Explain fingerprint region with example. 3
- (b) Explain the effect of intramolecular and intermolecular hydrogen bondings on the position of IR absorption frequency. Illustrate your answer with suitable example. 4
- (c) Discuss the effect of ring size on the carbonyl absorption frequency (IR) in cyclic ketones. 3
3. (a) Compare the IR frequencies of cyclohexanecarboxaldehyde and benzaldehyde. 3
- (b) Calculate the number of NMR signals for the following compounds :  $1\frac{1}{2} \times 2 = 3$

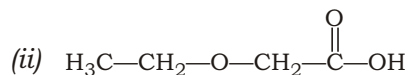
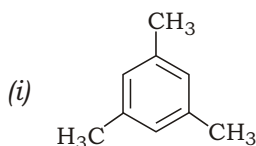


- (c) Why the carbonyl ( $>C=O$ ) absorption frequency in benzamide is at  $1693\text{ cm}^{-1}$  whereas in phenyl acetate it is at  $1730\text{ cm}^{-1}$ ? 4

( 3 )

OR

4. (a) What is meant by the term chemical shift? 2
- (b) Describe with examples the various factors which effect the magnitude of chemical shift. 3
- (c) A compound with molecular formula  $C_8H_6O_2$  gives the following signals in the NMR spectrum :  
8.06 (4H, m), 10.15 (2H, s) no  $D_2O$  exchangeable  
Identify the compound. 3
- (d) Calculate the number of NMR signals for the following compounds : 2



5. (a) Explain equivalent and non-equivalent protons. 2
- (b) What are the necessary conditions for the nuclei to be NMR active? 2

( 4 )

- (c) Calculate the index of unsaturation (IOU) or DBE for the compounds with molecular formula : 2
- (i)  $C_{11}H_{14}O$
- (ii)  $C_6H_7N$
- (d) A compound with molecular formula  $C_{15}H_{24}O$  gives the following signals in the NMR spectrum :  
1.47 (18H, s), 2.29 (3H, s),  
4.99 (1H, broad singlet), 7 (2H, s)  
Identify the compound. 4

OR

6. (a) Why sodium ethoxide cannot be treated as Grignard reagent? 2
- (b) Complete the following reactions : 2×3=6
- (i)  $3 EtMgBr + (EtO)_2CO \xrightarrow[2) aq. NH_4Cl]{1) Et_2O} ?$
- (ii)  $C_6H_{11}MgBr + Br-CH_2-\overset{Br}{\underset{|}{C}}=CH_2 \xrightarrow{Et_2O} ?$
- (iii)  $ClCH_2CO_2Et + 2 RMgX \xrightarrow[2) H^+]{1) Et_2O} ?$
- (c) Write a short note on organolithium compounds. 2

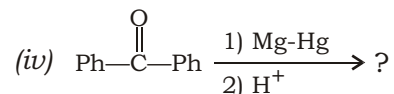
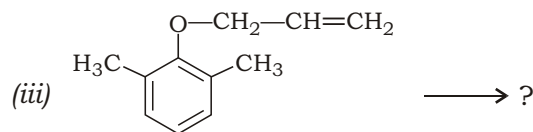
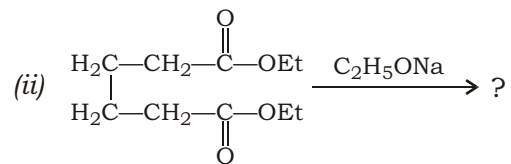
( 5 )

7. (a) Starting with EtOH and *n* Pr-OH, prepare pent-2-ene via a Grignard reagent. Is there more than one way? If so, which is the best and why? 4
- (b) Describe the abnormality of Grignard reagent with suitable example. 4
- (c) Complete the reaction : 2
- $$\text{PhMgBr} + \text{MeO}-\text{CH}_2-\text{CN} \xrightarrow[2) \text{H}^+]{1) \text{Et}_2\text{O}} ?$$

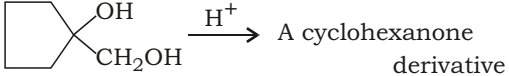
OR

8. Complete the following reactions with mechanism :  $2\frac{1}{2} \times 4 = 10$

(i) Benzaldehyde + Ethanolic KCN  $\longrightarrow$  ?



( 6 )

9. (a) Treatment of  $\text{Me}_2\text{C}=\text{CHCH}_2\text{CH}_2\text{Cl}$  with  $\text{CaCO}_3-\text{H}_2\text{O}$  gives cyclopropyldimethylmethanol. Suggest a mechanism. 4
- (b) Give the mechanism for the following conversion : 4
- 
- (c) Draw all possible conformations of 1,3-dibromocyclohexane. 2

OR

10. Write short notes on the following :  $2\frac{1}{2} \times 4 = 10$
- (a) Sigmatropic rearrangement
- (b) Baeyer-Villiger oxidation
- (c) Pinacol-pinacolone rearrangement
- (d) Beckmann rearrangement

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