

P.G. 1st Semester - 2017

CHEMISTRY

(ORGANIC)

Paper : MCHECCT103

Full Marks : 40

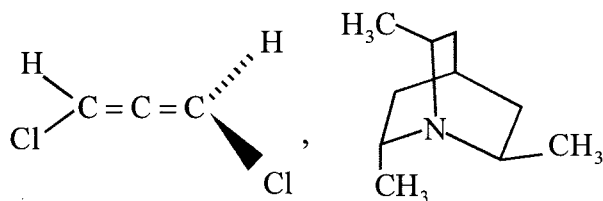
Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

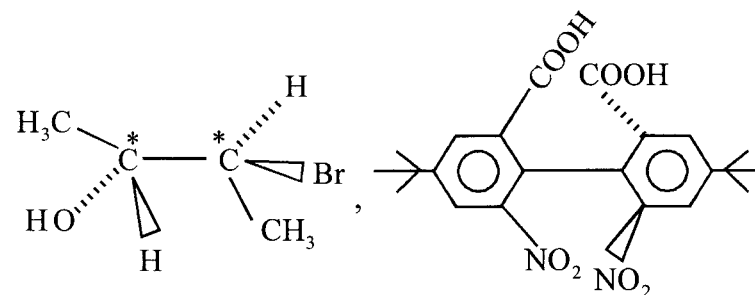
Answer any **five** questions taking at least **two**
from each group:

GROUP-A

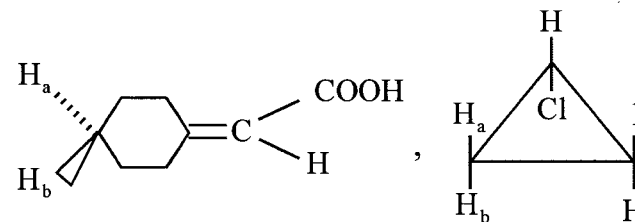
1. a) To which point group the following molecules belong?



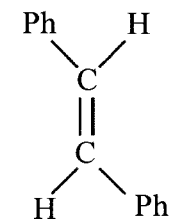
- b) Assign R/S designation of the following compounds:



- c) In each of the following compounds the hydrogens (marked) H_a & H_b are homotopic, enantiotopic or diastereotopic. Give replacement test in each case.



- d) Give the Re-Re, Re-Si or Si-Si descriptors to π -faces of the following compound.



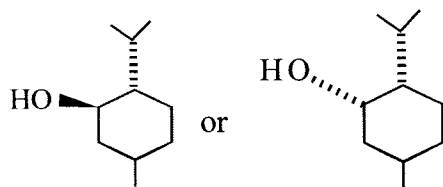
$$2+2+3+1=8$$

[Turn Over]

2. a) Write the major product of the following reaction using Felkin-Auh model.

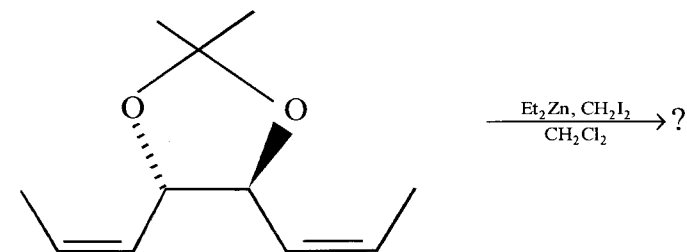


- b) Which of the following structures represents the configuration of the (–)-menthol if its ester with benzoyl formic acid gives (R)-atrolactic acid as the major product when reacted with CH_3MgX followed by hydrolysis. Give the mechanism of reactions.



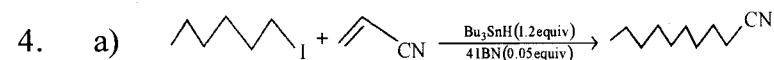
- c) Write the structure of (E)-2-Methyl cyclohexylidene acetic acid and explain which structure is more stable & why?
- d) A prostereogenic centre may or may not be prochiral centre— Explain with proper example. $2+2+2+2=8$
3. a) Tosyl hydrazones are good starting materials for generation of carbenes. Outline the mechanism of generation of carbene using this reaction.

- b) Give the product indicating the stereochemistry with mechanism



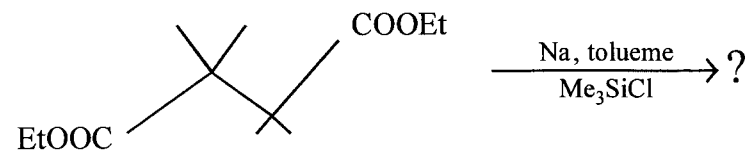
- c) Interpret the formation of racemic mixture of two exo-acetates from optically active exo-2-bornyl brosylate in Acetic acid medium.

$$2\frac{1}{2} + 2\frac{1}{2} + 3 = 8$$



Write down the detail mechanism of the reaction indicating the chemo-selectivity of different radicals generated in the reaction.

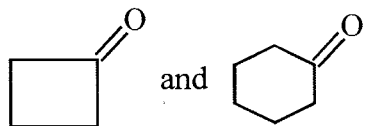
- b) Give product(s) with proper mechanism:



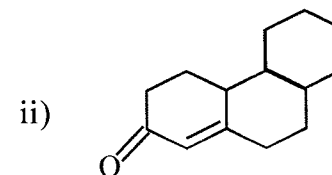
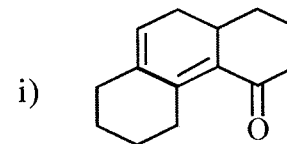
- c) Discuss the effect of electron withdrawing groups and electron releasing groups on radical stability considering the frontier molecular orbital approach. $3+2+3=8$

GROUP-B

5. a) What do you mean by resonance point in NMR spectroscopy?
- b) Why TMS is used as a reference standard in NMR-spectroscopy?
- c) An organic compound with molecular formula $C_8H_{14}O_4$ shows absorption in UV region at $213\text{ nm } t_{\text{max}} 60$. In infra-red, absorption bands are formed at $2941\text{--}2857\text{ cm}^{-1}$ (m), 1745 cm^{-1} (s) and 1458 cm^{-1} (m). In NMR, the signals observed are (i) $\delta 4.14$ quartet ($J=7.2\text{cps}$, 10.4 squares) (ii) $\delta 2.6$ singlet (10.8 squares) (iii) $\delta 1.27$ triplet ($J=7.2\text{cps}$, 16 squares). Suggest the most suitable structure for the compound from the given spectral data. $2+2+4=8$
6. a) What is the effect of hybridisation of carbon on the stretching frequency of C–H bonds?
- b) How will you distinguish between the following pairs on the basis of infra red spectroscopy?



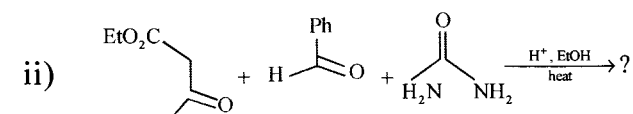
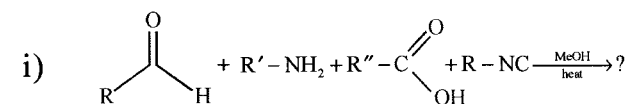
- c) Calculate λ_{max} for the following compound according to Woodward–Fieser Rules for dienes:



- d) Illustrate the AMX coupling in proton NMR spectrum of Furan-2-aldehyde.

$$1\frac{1}{2} + 1\frac{1}{2} + 2 + 3 = 8$$

7. a) Give product with probable mechanism for the following multicomponent reaction:



- b) Write a short note on:

Baylis-Hillman Reaction. $2\frac{1}{2} + 2\frac{1}{2} + 3 = 8$

8. a) In the mass spectrum of toluene, strong peaks are formed at m/e 91 & m/e 65. Also a broad peak appears at 46.4. Justify the origin of these signals.
- b) How do you explain that m/e 94 ion is formed in the spectrum of phenetol?
- c) Define McLatterty rearrangement with suitable example.
- d) What do you understand by N_2 rule?

$$2\frac{1}{2} + 2\frac{1}{2} + 2 + 1 = 8$$
