

This question paper contains 9 printed pages]

HPAS (Main)—2017

CHEMISTRY

Paper II

Time : 3 Hours

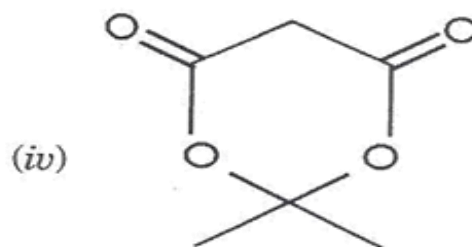
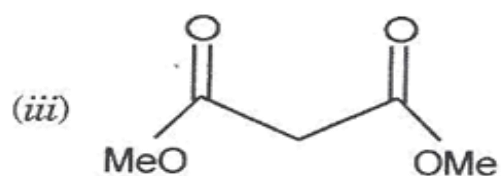
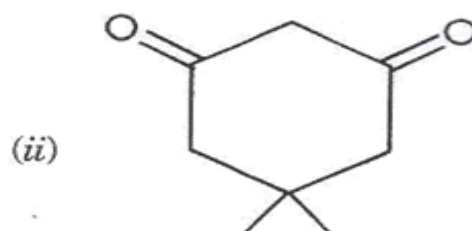
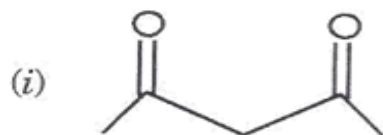
Maximum Marks : 100

Note :— Attempt *five* questions in all. Question No. 1 is compulsory. *All* parts of a question must be answered in continuation at one place.

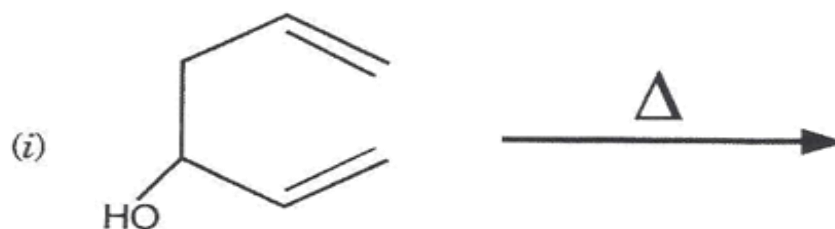
1. Answer all of the following :

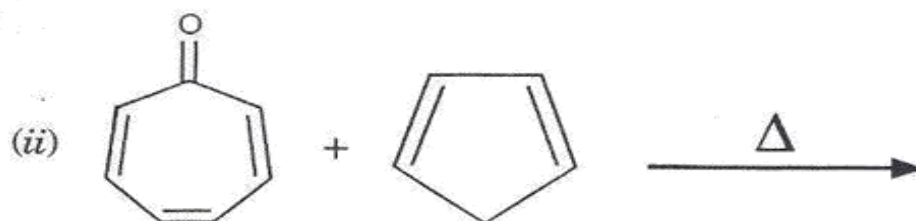
- (a) An organic compound having molecular formula $C_{10}H_{12}O_2$ exhibits the following spectral data :
IR : 3400 (br), 1600 cm^{-1} . 1H NMR : δ 1.85 (3H, *d*, $J = 6.0$ Hz), 3.8 (3H, *s*), 5.0 (1H, *s*, D_2O exchangeable), 6.0 (1H, *dq*, $J = 18$ and 6 Hz), 6.28 (1 H, *d*, $J = 18$ Hz), 6.75 (1H, *d*, $J = 8$ Hz), 6.8 (1 H, *s*), 6.90 (1 H, *d*, $J = 8$ Hz) ppm. Identify the product.

(b) Explain the following trends of acidity : 4



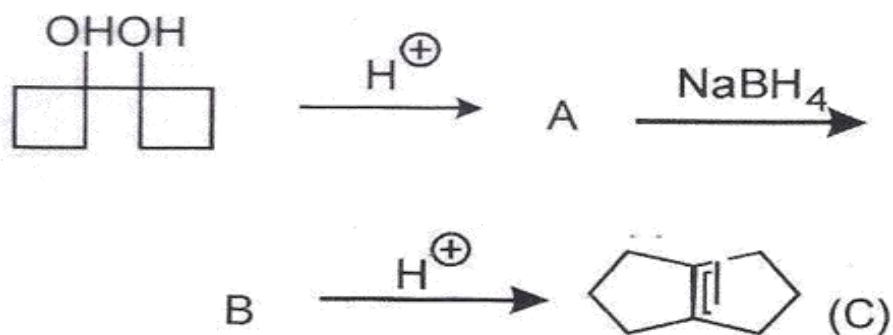
(c) What products are formed in the following reaction, and explain with suitable mechanism : 8





2. Answer all of the following :

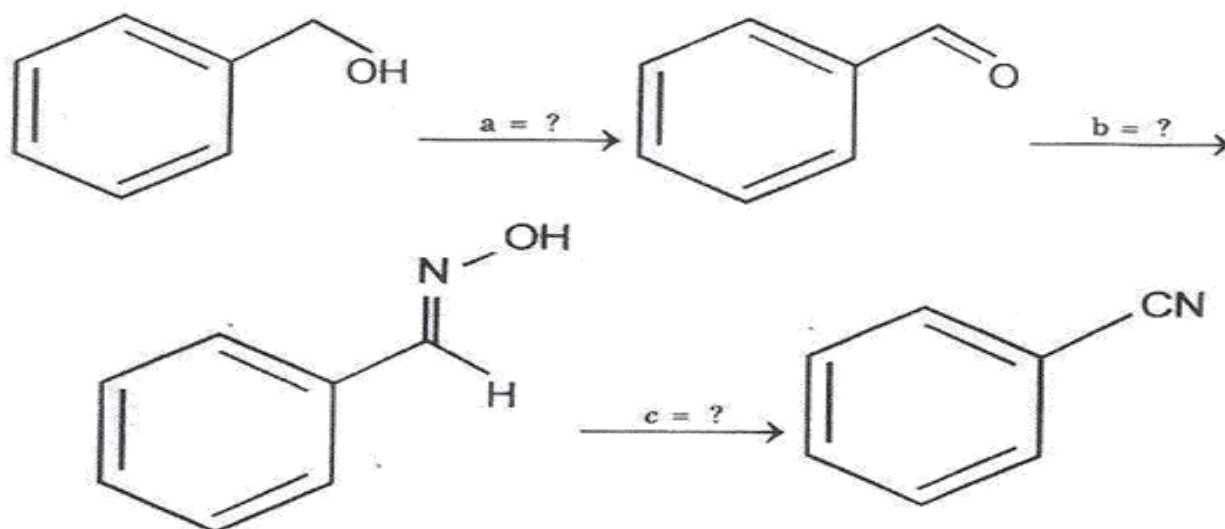
- (a) Identify A and B and suggest the mechanism for the following reaction : 7



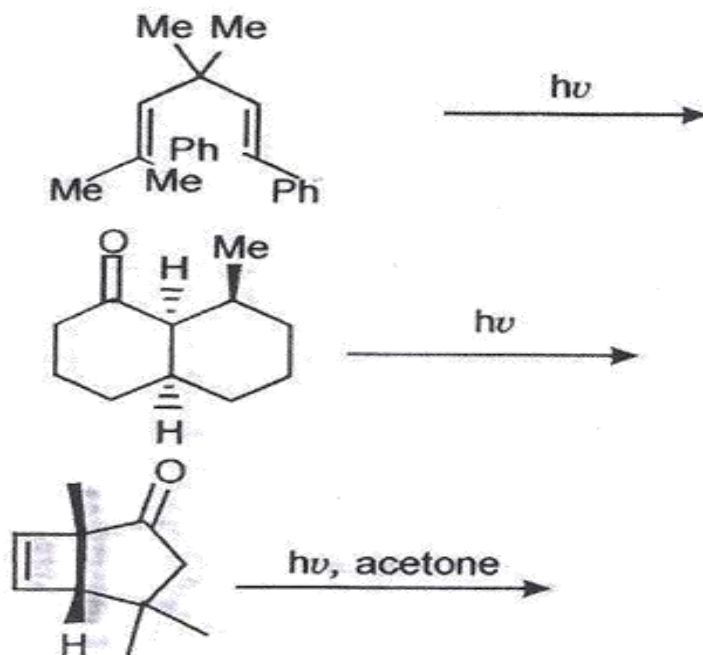
- (b) Give significance of Wittig reaction with suitable examples. 7
- (c) β -Hydroxy esters are prepared by organo-zinc and not by organo-magnesium reagents. Explain. 6
3. Answer the following :
- (a) How will you monitor the following reaction

sequence by IR ? Suggest the reagents a, b, and c.

6



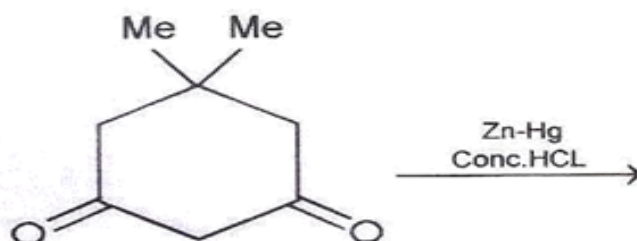
(b) Write the products of the following reaction and propose suitable mechanism for their formation : 8



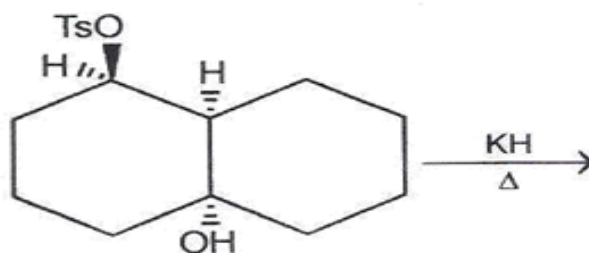
- (c) Azulene ($C_{10}H_8$) is a deep blue compound. Explain : (i) Aromaticity (ii) Dipole moment of 1.0 D

4. Explain the following :

- (a) Identify and propose the mechanism of the product obtained in the following conversion :



- (b) Write the mechanism of the following reaction :



- (c) Which form of ethylene glycol is stable and why ?

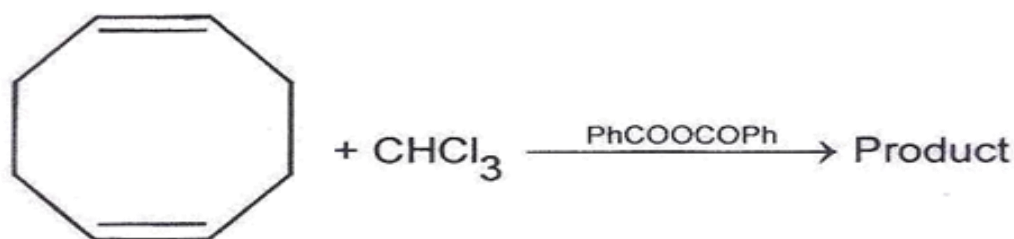
5. Answer the following :

(a) Which of the following compounds are chiral ?
Explain with reason. 6

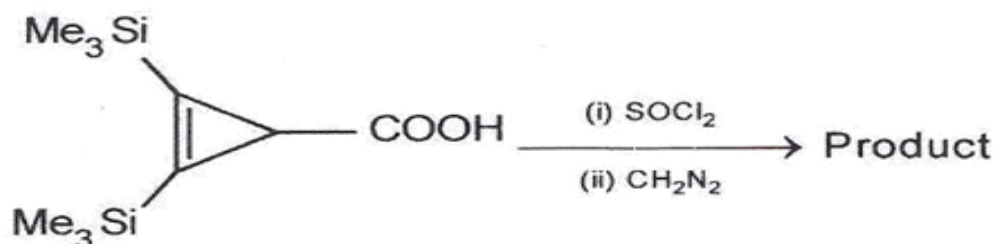
(i) Trans-cyclopentane 1, 2-dicarboxylic acid.

(ii) Cis-cyclopentane 1, 2-dicarboxylic acid.

(b) In the following reaction, identify the structure of the product and propose the reaction mechanism : 7

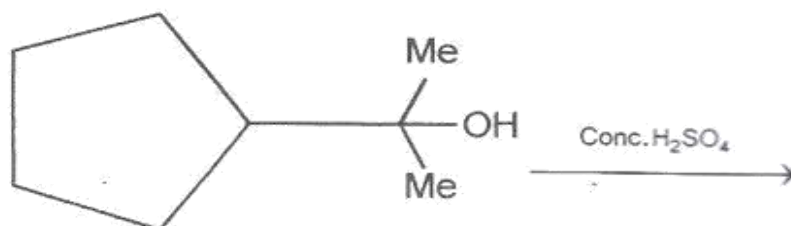


(c) Identify the product and write the mechanism in the following reaction : 7

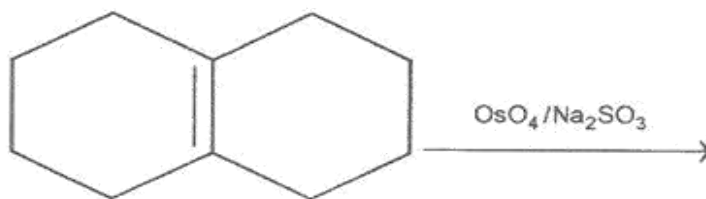


6. Answer the following :

- (a) Write down the mechanism for the major product formed in the sulphuric acid mediated rearrangement of compound : 8



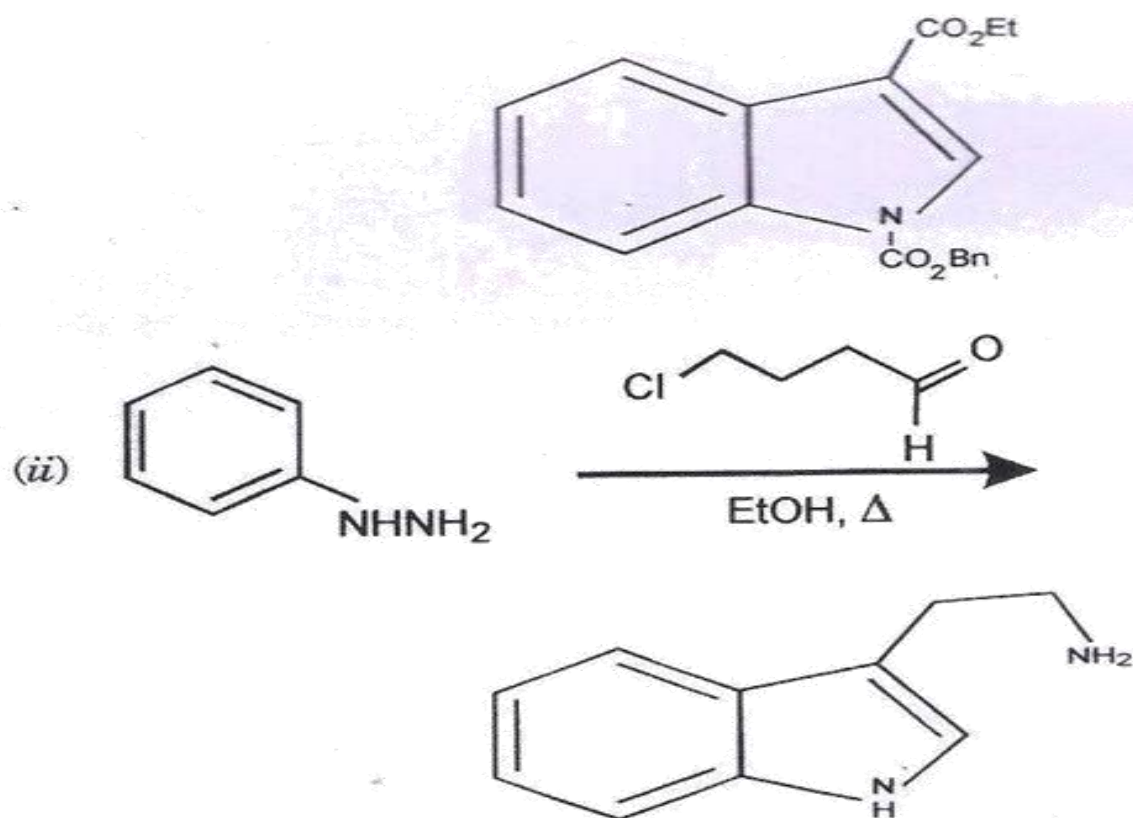
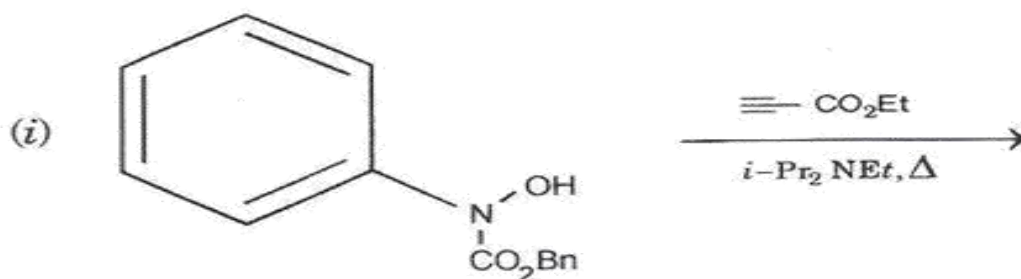
- (b) How many stereoisomers are possible in the following reaction ? Discuss about their optical activity. 6



- (c) Trans-4-*t*-butylcyclohexanol is more strongly absorbed on alumina than cis-isomer. Explain. 6

7. Answer the following :

- (a) Suggest the mechanisms for both the following indole synthesis : 8



(b) Explain the $\text{S}_\text{N}2$ mechanism with relevant equations and examples. Explain pseudo first order kinetics in this context. 6

(c) Discuss Beckman and Hofmann rearrangement with suitable example. 6

8. Answer the following :

(a) What is polymethanes ? What is the principal linkage in polymethanes ? Classify the following polymers on the basis of action of heat on them :

(i) Bakelite

(ii) Teflon.

6

(b) Write short notes on the following :

8

(i) Applications of supramolecular chemistry

(ii) Excited electron transfer.

(c) Write the product of the reactions with a suitable mechanism :

6

