

[77]

SEAT No. _____

No of Printed Pages: 04

SARDAR PATEL UNIVERSITY
M.Sc. (Chemistry)
Semester – I Examination
November 20, 2019 Wednesday
Time: 10:00 am – 1:00 pm
ORGANIC CHEMISTRY-I [PS01CCHE22]

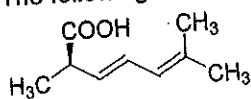
Maximum Marks – 70

[08]

Q.1 Select correct answer from the choices given below each of the following questions.
 Write only the correct code of answer in the provided answer book.

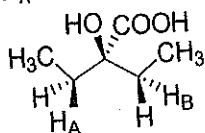
e.g. 1(a)-(iv).

(a) The following structure has _____ number of stereogenic centers.



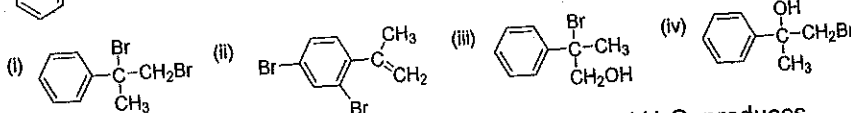
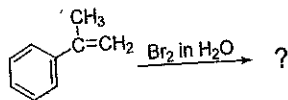
- (i) 1 (iii) 4
 (ii) 3 (iv) 5

(b) H_A and H_B in the following structure are _____

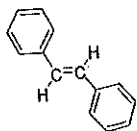


- (i) homotopic (iii) diastereotopic
 (ii) enantiotopic (iv) constitutionally heterotopic

(c) The correct major product in the following reaction is _____



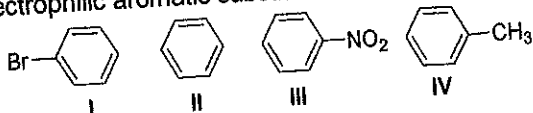
(d) *trans*-1,2-diphenylethene upon treatment with OsO_4 and H_2O_2 produces _____



- (i) Racemic mixture of (ii) and (iii) (iii) 1R,2R-diphenylethane-1,2-diol
 (ii) 1S,2S-diphenylethane-1,2-diol (iv) 1R,2S-diphenylethane-1,2-diol

(e) Which of the following reactions involves radical-ion pair held tightly in the solvent cage?
 (i) Wolff Rearrangement (iii) Stevens Rearrangement
 (ii) Sommet-Hauser Rearrangement (iv) Demjanov-Tiffeneu Rearrangement

(f) Arrange following compounds I - IV in increasing order of their reactivity towards electrophilic aromatic substitution reaction.



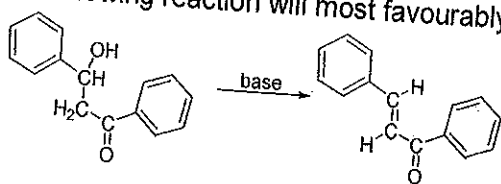
- (i) III < II < I < IV (iii) I < III < II < IV
 (ii) III < I < II < IV (iv) IV < II < III < I

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(g) The following reaction will most favourably occur through ___ pathway.

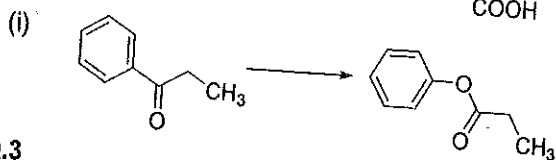
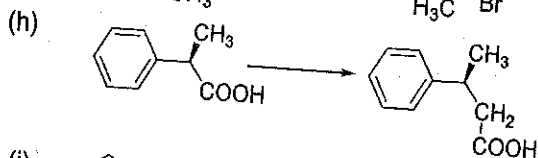
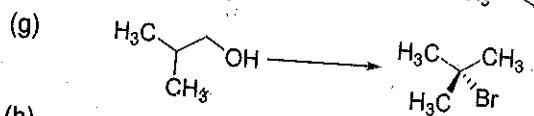
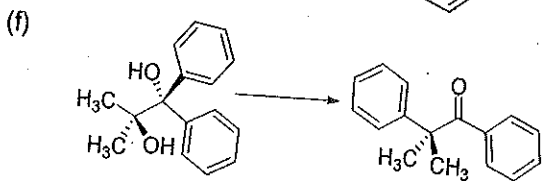
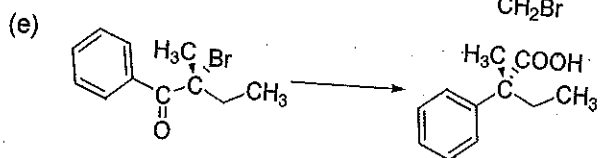
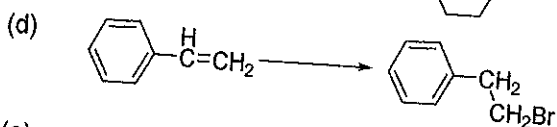
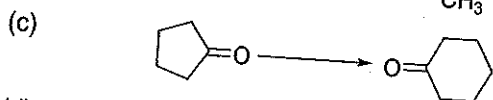
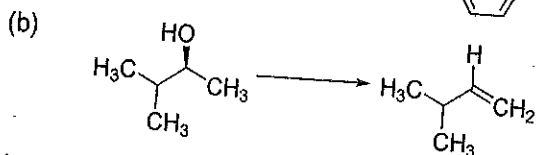
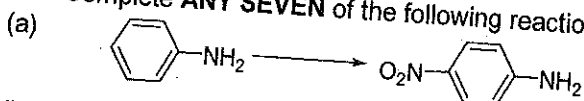


- (i) E1 (ii) E2 (iii) E_i (iv) E1cb

(h) In electrophilic aromatic substitution reactions, halogens exert _____
 (i) deactivating effect and are *ortho/para* directing
 (ii) activating effect and are *meta* directing
 (iii) deactivating effect and are *meta* directing
 (iv) activating effect and are *ortho/para* directing

Q.2 Complete ANY SEVEN of the following reactions suggesting most probable route.

[14]



Q.3

(a) Justify the following.

- (i) In spite of having two chiral conformations, n-butane is optically inactive.
 (ii) Homotopic ligands can exist in chiral as well as achiral molecules.

[06]

②

(b) Answer the following.

- (i) Draw staggered conformations of 2R,3R-butanediol and designate them by using Klyne Prelog terminology.
- (ii) Why does 6,6'-dinitrobiphenyl-2,2'-dicarboxylic acid exhibit optical activity? Why does it lose optical activity upon heating?

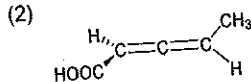
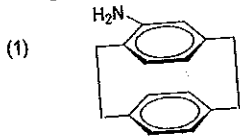
[06]

OR

[06]

(b) Attempt the following as suggested.

- (i) Show that enantiotopic and diastereotopic ligands can coexist in a molecule.
- (ii) Assign configurational symbols to the following molecules.



[06]

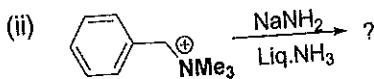
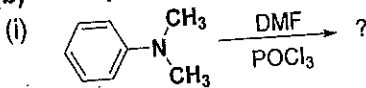
Q.4

(a) Attempt the following as directed.

- (i) What is the importance of Schmidt Reaction? Prove that it involves an intermediate step of dehydration during conversion of acetophenone to acetanilide.
- (ii) By isotopic labeling technique, show that Cannizzaro reaction is an intermolecular process.

[06]

(b) Complete the following reactions with mechanism.

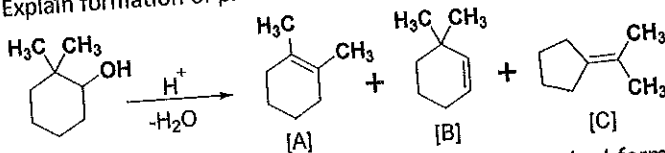


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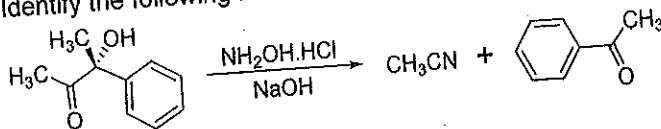
[06]

(b) Attempt as suggested.

- (i) Explain formation of products [A], [B] and [C] in the following reaction.



- (ii) Identify the following reaction and explain the product formation.

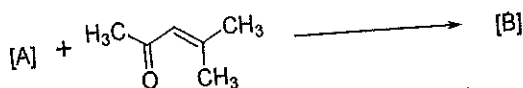
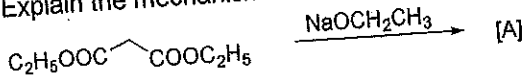


[06]

Q.5

(a) Attempt the following.

- (i) Explain the mechanism for formation of [B] in the following reaction.



- (ii) Show that iodide ion induced debromination reaction of 2R,3S-dibromobutane is stereoselective.

[06]

(b) Attempt following as suggested.

- (i) Why does addition of HBr to 3-methyl-1-butene not lead to the Markownikoff's product?
- (ii) Why addition of HBr to ethene is faster than 1-bromoethene?

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OR

(b) Answer the following.

- (i) Why does 2R-bromobutane produce *trans*-2-butene as the predominant product over *cis*-2-butene upon base induced dehydrobromination reaction?
- (ii) Discuss the factors favouring Hoffman elimination.

[06]

Q.6

(a) Answer the following.

- (i) Why does a mixture of HCl and AlCl₃ not lead to the product of addition with benzene?
- (ii) Why does nitration of methylbenzene produce 67% *para* and 32% *ortho* isomers as the major products over *meta* isomer?

[06]

(b) Justify following statements.

- (i) Friedel Craft acylation is more favoured than Friedel Craft alkylation in preparation of ethylbenzene from benzene.
- (ii) Benzoic acid and nitrobenzene cannot be used as coupling components in diazo coupling reactions.

[06]

OR

(b) Attempt the following.

- (i) How do pyridine and pyrrole differ in their reactivity towards electrophilic aromatic substitution reactions?
- (ii) What is primary kinetic isotope effect? How it can be employed to determine mechanism of nitration of benzene?

[06]

— X —
④