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SEAT No. \_\_\_\_\_

No of Printed Pages: 03

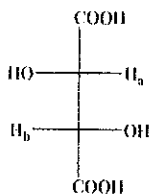
**SARDAR PATEL UNIVERSITY**  
**M.Sc. (CHEMISTRY), Semester - I, Examination**  
**Friday, 22<sup>nd</sup> March 2019**  
**PS01CCHE22 - ORGANIC CHEMISTRY - I**

Time: 10:00 am - 01:00 pm

Maximum Marks - 70

**Q.1** Select the correct answer from the option given below for each of the following questions. [08]  
 Write **ONLY ANSWERS** in the provided answer book. [e.g. Q.1 (1)-(b)]

(1) Consider the following statements in respect of the following compound

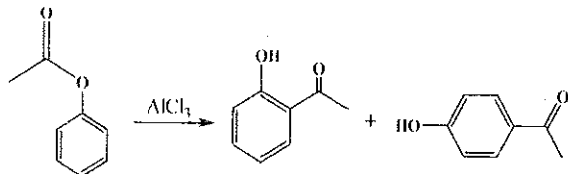


1.  $H_a$  and  $H_b$  have threo relationship.
2.  $H_a$  and  $H_b$  are homotopic.
3.  $H_a$  and  $H_b$  are diastereotopic.
4.  $H_a$  and  $H_b$  are enantiotopic.

Which of the above statement are correct?

- |            |            |
|------------|------------|
| a) 1 and 2 | b) 2 and 3 |
| c) 1 and 4 | d) 1 and 3 |

(2)



What is the name of this reaction?

- |                                    |                           |
|------------------------------------|---------------------------|
| a) Fries rearrangement             | b) Claisen rearrangement  |
| c) Pinacol-pinacolon rearrangement | d) Backmann rearrangement |

(3) **Assertion A:** Like bromination of benzene, bromination of phenol is also carried out in the presence of Lewis acid.

**Reason B:** Lewis acid polarises the bromine molecule.

- |   |   |
|---|---|
| a) Both A and B are true; B is the correct explanation. | b) Both A and B are true; B is not the correct explanation. |
| c) A is true and B is false.                            | d) A is false and B is true.                                |

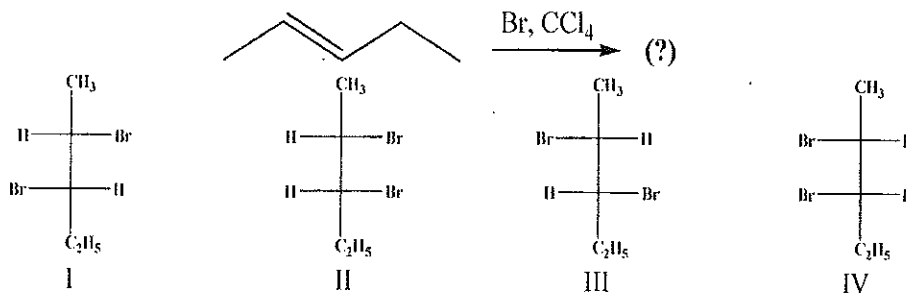
(4) The halide, which undergoes nucleophilic substitution (by  $S_NAr$ ) most readily is \_\_\_\_\_

- |                             |                              |
|-----------------------------|------------------------------|
| a) 1-chloro-4-methylbenzene | b) 1-chloro-4-methoxybenzene |
| c) 1-chloro-4-nitrobenzene  | d) 1,4-dichlorobenzene       |

(5) The number of asymmetric carbon atoms and the number of optical isomer in  $\dot{C}H_3(CHOH)_2COOH$  are respectively

- |            |            |
|------------|------------|
| a) 3 and 4 | b) 1 and 3 |
| c) 2 and 4 | d) 2 and 3 |

(6) Which of the statements is most correct regarding the products expected from the halogenation reaction shown below?



**Option:**

- a) Equal amounts of I and II are produced.      b) Equal amounts of II and IV are produced.  
c) Equal amounts of I and IV are produced.      d) Equal amounts of II and III are produced.
- (7) The reaction between two molecules of ethyl acetate is called \_\_\_\_\_  
a) Clemmensen reduction      b) Knoevenagel condensation  
c) Claisen condensation      d) Benzoin condensation
- (8) Match the reaction given in **column I** with the types of reaction given in **column II**

column I	column II
1. benzene + acetyl chloride $\xrightarrow{\text{AlCl}_3}$ acetophenone	A. Nucleophilic aromatic substitution
2. 1-propene + HBr $\longrightarrow$ 2-bromopropane	B. Electrophilic aromatic substitution
3. p-chloronitrobenzene $\xrightarrow{\text{NaOH}}$ p-nitrophenol	C. Saytzeff Elimination
4. 2-bromobutane $\xrightarrow{\text{Base}}$ 2-butene	D. Electrophilic addition
	E. Nucleophilic addition

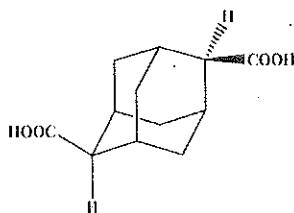
**Option:**

- a) 1-(A); 2-(B); 3-(E); 4-(D)      b) 1-(B); 2-(C); 3-(A); 4-(D)  
c) 1-(B); 2-(D); 3-(A); 4-(C)      d) 1-(C); 2-(A); 3-(D); 4-(E)

**Q.2** Answer ANY SEVEN of the following

[14]

- (a) Explain: Stereogenicity and chirogenecity are different properties.  
(b) Dickmann condensation is an intramolecular claisen condensations explain.  
(c) Why aprotic bipolar solvent is favorable for bimolecular elimination?  
(d) Discuss the drawbacks of Friedel Craft alkylation with suitable example.  
(e) What are the symmetry criteria to differentiate homotopic and enantiotopic faces? Explain it by citing proper example.  
(f) Explain: Cope Knoevenagel condensation advantageous over Knoevenagel condensation  
(g) Give the spectral evidences for the involvement of cyclic halonium ion in halogenation of an alkene.  
(h) How can you detect the presence of benzyne using mass spectroscopy?  
(i) Decide chirality symbol for the following compound and show that it is independent of viewer side.



**Q.3**

- (a) Calculate and draw total number of stereoisomer, number of active forms and meso forms for 2,3,4-trihydroxypentane. Assign chirality descriptor to all stereoisomer. [06]  
(b) Explain the following:  
i) Limitation of Fischer Projection formula by taking D-(-)-lactic acid as the reference molecule. [03]  
ii) The methylene hydrogens (-CH<sub>2</sub>-) have different topic relationship in diastereomeric 1,2-dichlorocyclopropane. [03]

OR

- (b) Justify the following:  
i) Chirality is geometric properties of whole molecule and it does not reside on any atom. [03]  
ii) Enantiotopic and homotopic ligands can co-exist. [03]

Q.4

(a) Justify the followings:

- Favorskii rearrangement the direction of cyclopropane ring opening is governed by the stability of carbanionic intermediate going to be generated. [06]
- Wagner Meerwein rearrangement involving carbon-carbon migration leads to skeleton reorganization

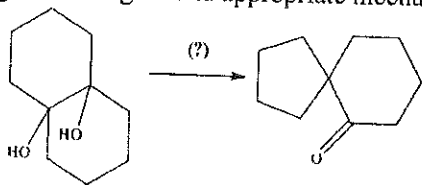
(b) Answer the followings:

- Discuss the effect of size of the base on the stereochemical outcome of crossed aldol reaction between 2-pentanone and benzaldehyde. [03]
- Explain: Sommelet Hauser rearrangement involves 2,3-sigmatropic shift. [03]

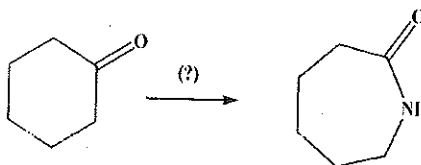
OR

(b) Suggest the reagent and appropriate mechanism for the following transformation [06]

i)



ii)



Q.5

(a) Answer the following as directed:

- Define the term: Stereoelectronic requirement. Explain stereoelectronic requirement for E-2 elimination with suitable example. [03]
- Explain the importance of Cyano ethylation reaction in organic synthesis. [03]

(b) Answer the followings:

- Justify: "Halogenation of alkene is not a concerted process". [03]
- Explain: Any crowding in transition state favors Hoffmann elimination. [03]

OR

(b) Answer the followings:

- Justify: "Halogenation of *cis*-2-butene is a stereoselective as well as stereospecific reaction. [03]
- Explain: Iodine ion induced dehalogenation of 2,3-dibromobutane gives *trans*-2-butene as a major product. [03]

Q.6

(a) Answer the following as directed:

- What is IPSO substitution? Explain the factors that govern IPSO substitution with suitable example. [03]
- Justify: Benzene gives deuterobenzene in presence of DCl/AlCl<sub>3</sub> but not the product of addition. [03]

(b) Explain the followings:

- The effect of temperature on the sulphonation of naphthalene. [03]
- Pyridine hardly undergoes electrophilic substitution even at more favored position 3. [03]

OR

(b) Justify the followings:

- Nucleophilic aromatic substitution of activated aromatic halide is a two step process. [03]
- m*-dinitrobenzene is a product of kinetic control in nitration of nitrobenzene. [03]

—X—  
③

