

This question paper contains 5 printed pages]

AI—80—2017

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2017

(CBCS Pattern)

CHEMISTRY

Paper (CH-412)

(Organic Chemistry—I)

(Monday, 13-11-2017)

Time : 10.00 a.m. to 1.00 p.m.

Time—Three Hours

Maximum Marks—75

- N.B. :—*
- (i) Attempt *all* questions.
 - (ii) Figures to the right side indicate full marks.
 - (iii) Use of Logarithmic table and calculator is allowed.
 - (iv) Multiple choice questions (MCQs) should be attempted only once on page no. 3 of answer-book with complete answer.

1. Attempt any *three* of the following : 15

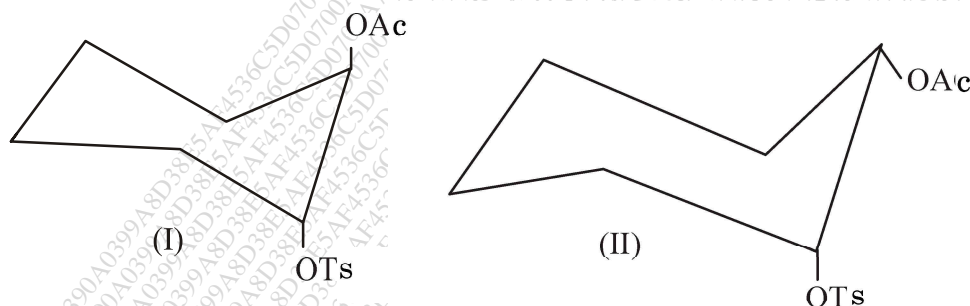
- (a) Why bromination of toluene is five times faster than that of *t*-butyl benzene ?
- (b) Why cyclopentadiene is much more acidic than 1,3-cyclohexadiene, while cyclopentadiene is much less acidic than an allylic compound ?
- (c) Nucleophilic substitution at chiral carbon by SN^2 mechanism is not accompanied by racemisation but by inversion.
- (d) What is the importance of photosensitizer in photochemistry ? Which type of compounds behave as photosensitizer ?
- (e) Discuss the photochemistry of 1,3-butadiene.

P.T.O.

2. Attempt any *three* of the following :

15

- (a) What are carbenes ? How are they generated ? Give the structures of singlet and triplet methylene.
- (b) What is aromaticity ? Explain the aromaticity of benzenoid and non-benzenoid compounds.
- (c) Why the trans isomer (I) undergoes acetylation 670 times faster than the cis isomer (II) and that the product has the same cis stereochemistry in both cases :



- (d) Discuss the mechanism of the photoreduction of benzophenone leading to the formulation of benzopinacol.
- (e) Discuss the photochemical smog and PAN formation.

3. (a) Comment on the following :

7

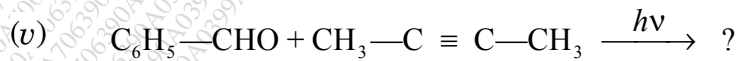
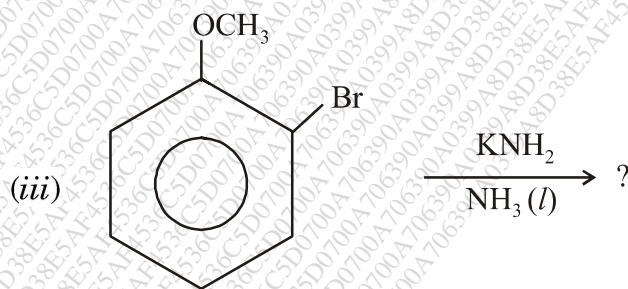
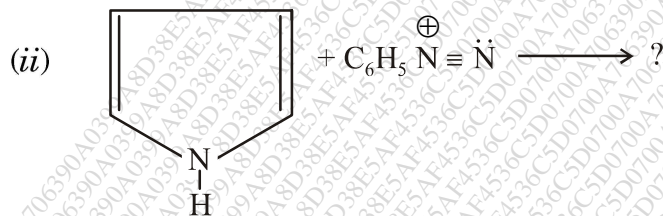
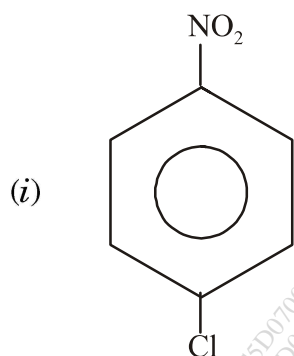
- (i) Kinetically and thermodynamically controlled products.
- (ii) Role of cross over experiments in the determination of the mechanism of organic reactions.

Or

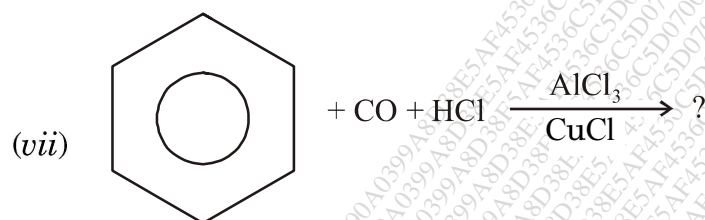
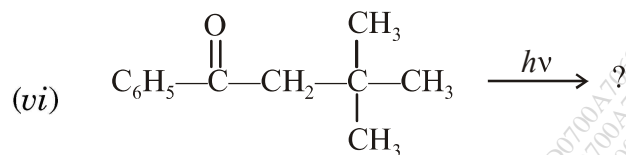
Comment on the following :

- (i) Jablonski diagram
- (ii) Photochemistry of vision.

- (b) Predict the product(s) with mechanism of the following
(any four) :



P.T.O.



4. (a) Explain photofries reaction and $n\pi - p\pi$ methane rearrangement. 7

Or

Explain with mechanism :

(i) Smiles rearrangement

(ii) SET mechanism.

- (b) Discuss the following :

8

(i) Orientation and reactivity in monosubstituted benzene in Aromatic electrophilic substitution.

(ii) Effect of substrate and leaving group on aliphatic electrophilic substitution reaction.

Or

Comment on the following :

(i) Stability of carbocations and carbanions.

(ii) Cis-trans isomerisation of Alkene.

5. (a) Select the *correct* answer from the given options for each of the following :

5

(i) Geometry of trifluoromethyl free radical is :

- (a) Planar (b) Pyramidal
(c) V-shaped (d) Tetrahedral.

(ii) Which among the following anions is the best nucleofuge ?

- (a) $\text{Ac}\overset{\ominus}{\text{O}}$ (b) $\overset{\ominus}{\text{O}}\text{H}$
(c) $\text{Ts}\overset{\ominus}{\text{O}}$ (d) $\text{Et}\overset{\ominus}{\text{O}}$

(iii) Addition of bromine to *cis* 2-butene gives :

- (a) meso form
(b) dl-pair of enantiomer
(c) both (a) and (b)
(d) none of the above

(iv) Which among the following undergoes nitration most readily ?

- (a) Benzene (b) Acetanilide
(c) Acetophenone (d) Chlorobenzene

(v) Which of the ketone undergoes photoreduction ?

- (a) Benzophenone (b) Micheler's ketones
(c) Both (a) and (b) (d) None of these

(b) Write short notes on any *two* :

10

(i) Di- π methane rearrangement

(ii) Aromaticity of Azulene

(iii) Alternant and non-alternant hydrocarbons.