REV-00
MSC/23/28

2014/01

M.Sc. CHEMISTRY
First Semester
Organic Chemistry-I
(MSC - 01)

Duration: 3Hrs. **Full Marks: 70**

Part-A (Objective) =20
Part-B (Descriptive)=50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

1. Answer the following questions (any *five*) **2×5=10**

a) Define carbocations. Give one method of generation of carbocation.

b) What happens when chloroform reacts with NaOH? Write down the related reaction.

c) Why pyridine is less reactive than benzene towards electrophilic substitution?

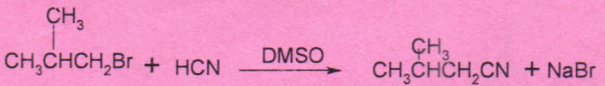
d) A hydrogen atom at the α-position with respect to a carbonyl group is more acidic in nature than that of an ordinary C-H hydrogen. Give reasons.

e) Which of the following would give white precipitate with $AgNO_3$ solution and why?

CH_3-CH_2-CH_2-Cl, CH_2=CH-CH_2-Cl, C_6H_5Cl

f) Write the mechanism and stereochemistry of S_E1 reaction.

g) Predict whether the following reaction will proceed by S_N1 and S_N2. Write the mechanism of the path followed by it.



2. Answer the following questions (any *five*) **3×5=15**

a) How can you convert methanoic acid to ethanoic acid and vice-versa?

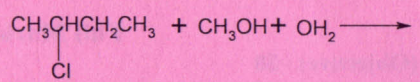
b) What is acidity constant? Aniline is a weak base in water but a strong base in sulphuric acid. Give reasons.

c) Tropylium cation is more stable than benzyl cation. Explain.

d) Singlet carbenes react with olefins stereospecifically, while triplet carbenes do not. Explain.

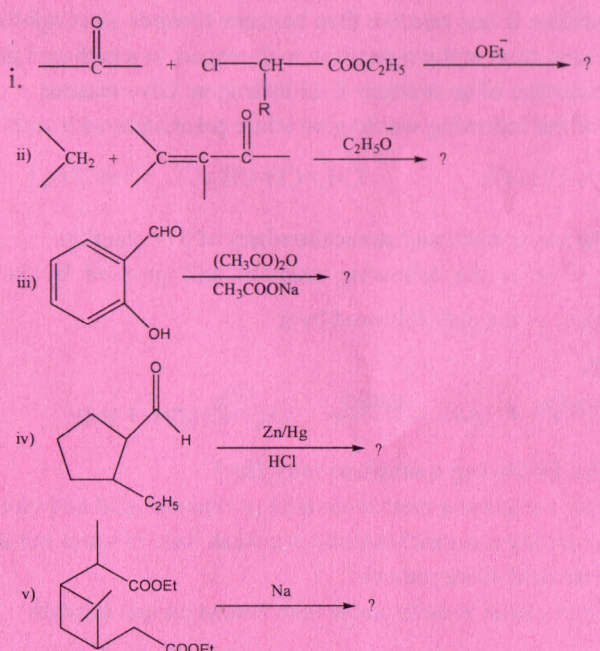
e) How is sulphur atom involved as a neighboring group in a chemical reaction? Discuss with a suitable example.

f) What will be the product for the following reaction? Write the energy profile diagram for the path followed by it.



g) When an electrophilic substitution is carried out at an allylic substrate, the product may be rearranged. Explain the given statement.

3. Complete the following reactions. Also suggest the mechanisms involved in each case. (any ***three***) **3×5=15**



4. Answer the following questions (any *two*) **2×5=10**

a) Explain why benzene does not react with nucleophilic substrate whereas nitrobenzene reacts with strong nucleophile.

b) Discuss the mechanism and stereochemistry of bromination of alkene.

c) What is ipso attack? Explain with suitable example.

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(The figures in the margin indicate full marks for the questions)

Duration: 20 minutes **Marks – 20**

PART A- Objective Type

I. Choose the correct answer **1×20=20**

1. BF_3 is an acid, according to

a) Arrhenius Concept *b)* Bronsted-Lowry Concept
c) Lewis Concept *d)* none of these.

2. Solvolysis of C-Cl bond gives

a) carbanion *b)* carbocation *c)* nitrene *d)* carbene

3. Most stable carbocation is

a) Tropylium cation *b)* Ph_3C+
b) c) $MeCH_2+$ *d)* $CH_2=CH-CH_2+$

4. Carbenes are neutral organic species having only

a) 2 valance electrons *b)* 4 valance electrons
c) 6 valence electrons *d)* 8 valence electrons

5. Which of the following intermediate is found in the atmosphere of Jupiter?

a) carbocation *b)* nitrene *c)* carbene *d)* free radical

6. Enamine is found as a reactive intermediate in

a) Mannich reaction *b)* Michael reaction
c) Robinson annulations *d)* none of these

7. The product of Stork enamine reaction is an
a) α, β-unsaturated carbonyl compounds
b) α, β-unsaturated amines
c) α, β-unsaturated alcohols
d) none of these

8. Hammett equation is based on the acidity of
   a) o-substituted aromatic carboxylic acids
   b) p & m- substituted aromatic carboxylic acids
   c) o & m- substituted aromatic carboxylic acids
   d) o & p- substituted aromatic carboxylic acids

9. Non-conjugated cylcohexadiene is a product of

   a) Barton reaction *b)* Birch reduction *c)* Clemensen reduction *d)* Chichibabin reaction

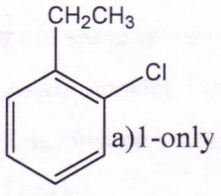
10. Reaction of phenol with alkaline carbon tetrachloride gives

   a) salicylaldehyde *b)* salicylic acid *c)* cinnamic acid *d)* benzoic acid

11. Clemensen reduction is carried out in

   a) basic medium *b)* neutral medium *c)* acidic medium *d)* none of these

12. Which of the following compounds give single benzyne intermediate on reaction with sodamide.



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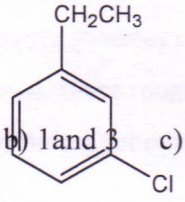

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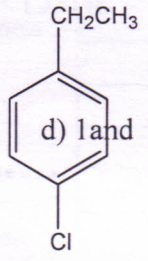


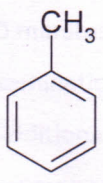
(3)

a)1-only b) 1and 3 c) 3 only d) 1and 2

13. Statement given below which one is true for nucleophilic aromatic (S_NAr) substitution

   a) A nitro group strongly activates the ring towards nucleophilic aromatic substitution.
   b) The (S_NAr) reaction is facilited when electrons flow from the attacking species to the aromatic ring
   c) The (S_NAr) follows the 2^{nd} order kinetics.
   d) All the above statements are true.

14. Fridel Craft acylation cannot be found which of the following compound.



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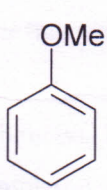

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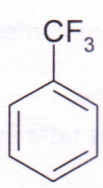

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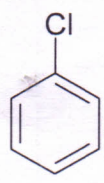

(4)

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