# MSC
## First Semester
## INORGANIC CHEMISTRY
## (MSC-01)

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

**Part B (Descriptive)**

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

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

*a)* What is carbocation? On what basis carbocations are classified?

*b)* $C_6H_5CHClCH_3$ gives white precipitate of AgCl with $AgNO_3$ immediately as compared to $Me_2CHCl$. –Explain.

*c)* White crystalline solid triphenylmethanol gives orange coloured solution when dissolved in $H_2SO_4$. Give reason.

*d)* What is Birch reduction? What is the role of Na metal in this reaction?

*e)* Cinnamaldehyde though contains α-hydrogen, still fails to undergo aldol condensation. Explain

*f)* What will be the product of Rosenmund reduction in the absence of $BaSO_4$? Justify your answer.

*g)* What is diazo coupling reaction? Explain its mechanism with its application.

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

*a)* Benzyl carbocation is more stable than ethyl carbocation. Give reason.

*b)* What is the similarity between $SE^2$ and $SN^1$ reaction? Define the term isoinversion and isorecemisation .

*c)* Why crotylmercuric bromide reacts faster with HCl than n-butylmercuric bromide?

*d)* Why chlorobenzene deactivates the electrophilic substitution reaction and are ortho para directors?

*e)* Discuss Brown's selectivity relationship with a mathematical expression. Show the relationship between Sf and f through mathematical expression.

*f)* Define $S_Ni$ mechanism with example. Why RCOX is more reactive than $R_2CH_2X$ towards Nucleophilic substitution reaction.

**3. Answer the following questions** (any *two*)

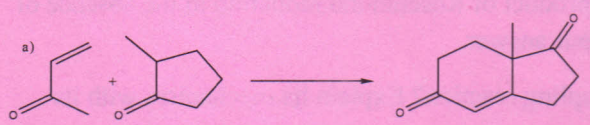
*a)* Define pseudo-first order reaction. Why front side $S_N2$ mechanism has never been formed? 2+3 = 5

*b)* What do you mean by neighbouring group participation? Discuss the concept of neighbouring group participation in the hydrolysis of 1,2 chlorohydrin. **2+3=5**

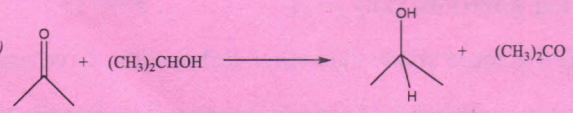
*c)* What is Hammett equation? Discuss the physical significance of the terms, reaction constant and substitution constant, that appear in this reaction. **3+1+1=5**

**4. How will you carry out the following conversions?**
**Also suggest the mechanism involved in each case. (any *three*)**
**5×3=15**

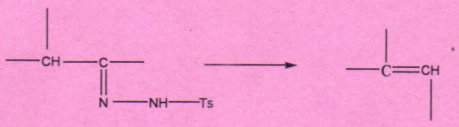
a)



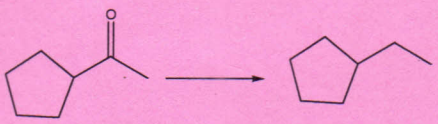
b)



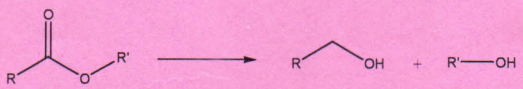
c)




d)




e)

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# MSC
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## ORGANIC CHEMISTRY-I
## (MSC-01)

## PART A: Objective

**Duration: 20 minutes** **Marks – 20**

**Choose the correct answer:** **1 × 20 = 20**

**1.** Stronger the base, smaller will be the
a) $P^Ka$ value b) $P^Kb$ value
c) $P^H$ value d) none of these

**2.** Most stable carbanion is
a) 1° alkyl carbanion b) 2° alkyl carbanion
c) 3° alkyl carbanion d) None of these

**3.** Photochemical or thermal cleavage of cyclopropanes and oxiranes give
a) carbocations b) carbanions
c) carbenes d) free radicals

**4.** Nitrenes add to C=C bonds to form a class of heterocyclic compounds called
a) pyrimidies b) aziridines
c) pyridazines d) pyrolidines

**5.** A carbocation may undergo molecular rearrangement to produce a more stable
a) carbanion b) carbocation
c) free redical d) carbine

**6.** The most stable carbocation is
a) $Ph_3C^+$ b) $Me_3C^+$
c) $CH_2$=CH-$CH_2^+$ d) Tropylium cation

**7.** Organic reactive intermediate found in the atmosphere of Jupiter is
a) Carbene b) Nitrene
c) carbanion d) free redical

**8.** Reductive amination of carbonyl compounds is called
a) Mannich reaction b) Robinson annulations
c) Leuckart reaction d) Shapiro reaction

**9.** Robinson annulations is carried out in

a) acidic medium
b) basic medium
c) Neutral medium
d) None of these

**10.** The product of Shapiro reaction is

a) an alcohol
b) an aldehyde
c) an α-hydroxy ester
d) an alkene

**11.** $SE^2$ (back) reaction shows

a) Retention of configuration
b) inversion configuration
c) Racemic mixure
d) diastereomers

**12.** $SE^i$ mechanism basically involves

a) bond breaking bond making process in one step
b) only bond breaking process
c) only bond making process
d) No bond making bond breaking process

**13.** Solvolysis effect enhances the reaction rate of

a) $SN^2$ reaction
b) $SN^1$ reaction
c) $SE^2$ reaction
d) $SN^1$ & $SN^2$ reactions

**14.** Crotyl mercuric bromide reacts with HCL faster than n-butylmercuric bromide about

a) $10^4$ times
b) $10^6$ times
c) $10^7$ times
d) $10^9$ times.

**15.** When $NO_2^+$ ions attack at ipso position, there are at **least**

a) one possible fates for arenium ion
b) two possible fates for arenium ion
c) four possible fates for arenium ion
d) five possible fates for arenium ion

**16.** The selectivity Sf of a reaction is defined as

a) $\log \frac{Pf^{mc}}{Of^{mc}}$
b) $\log \frac{Of^{mc}}{Pf^{mc}}$
c) $\log \frac{Pf^{mc}}{mf^{mc}}$
d) $\log \frac{Of^{mc}}{mf^{mc}}$

**17.** $SN^1$ reaction proceeds very rapidly at

a) the primary substrates only.
b) the secondary substrates only
c) the primary and secondary substrates
d) the tertiary substrates only

**18.** $SN^2$ reaction results rarely at

a) the primary substrates only

b) the secondary substrates only

c) the tertiary substrates only

d) the primary and secondary substrates only

**19.** The tetrahedral mechanism is often called as

a) substitution reaction

b) addition reaction

c) elimination reaction

d) addition reaction

**20.** Bicyclic bridgehead substrates are less favourable for $SN^2$ reaction because it has

a) non-planner carbocation intermediate

b) planner carbocation intermediate

c) pyramidal carbocation intermediate

d) no carbocation intermediate

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