

Reg. No..... Name: .....

**M SC DEGREE END SEMESTER EXAMINATION 2014 -15**  
**SEMESTER -1: SUBJECT- CHEMISTRY**  
**COURSE CODE : P1CHET02/P1CPHT02- STRUCTURAL AND MOLECULAR**  
**ORGANIC CHEMISTRY**

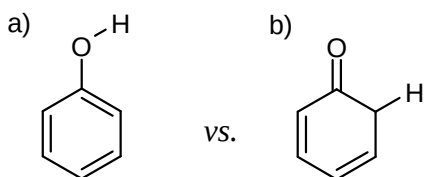
Time: 3 Hours

Max. Marks: 75

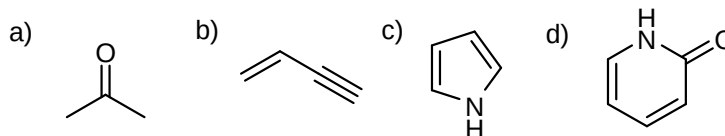
**Section A**

(Answer **any TEN** questions. Each question carries **2** Marks)

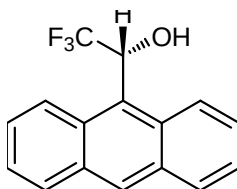
- Describe Paterno-Buchi reaction with example.
- Predict the stronger acid of the two with suitable explanation.



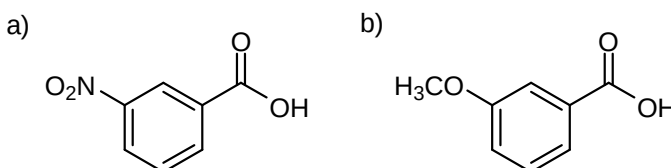
- State the hybridization of the non-hydrogen atoms of the following molecules.



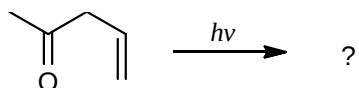
- Define inductive effect with suitable example.
- State the absolute configuration of the chiral centers present in the molecule.



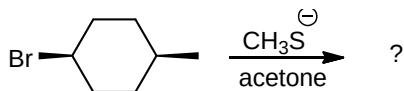
- Predict which of the two following acid is more acidic. Provide an explanation for the difference in acidity utilizing inductive and/or resonance effects in your answer (whatever is most applicable).



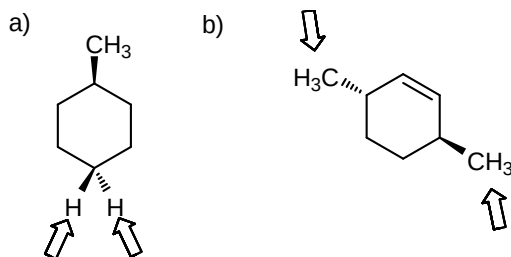
7. Complete the following reaction and state the name of this reaction.



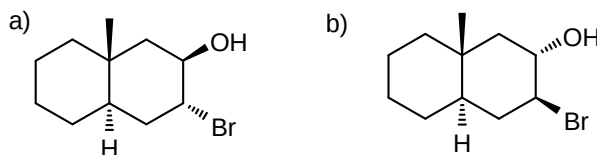
8. Predict the major product of the following reaction.



9. In each of the following state whether the indicated groups or atoms are homotopic/enantiotopic/ diastereotopic



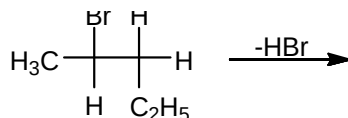
10. Which of the following two compounds would form an epoxide on treatment with base?



11. What are hard and soft acid and bases? State the Hard and Soft Acid-Base principle.

12. Explain hyperconjugation with suitable example.

13. Predict the product of the Saytzeff elimination of HBr from following compound. Draw the two possible products and indicate the one which is the only product formed. (Hint: Draw the Newman projection)



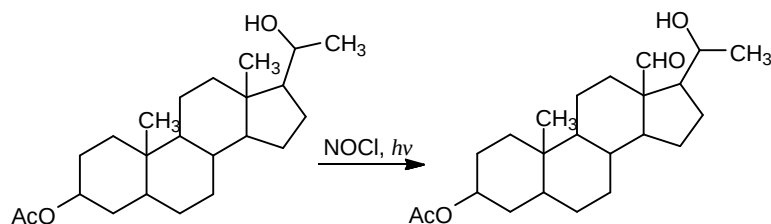
(10 x 2 = 20)

## Section B

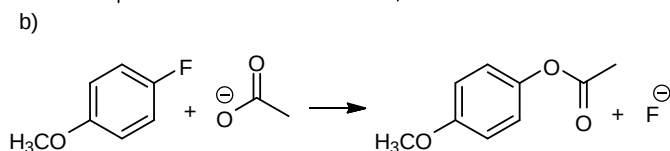
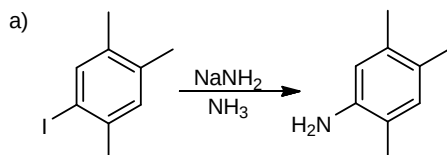
(Answer 5 questions by attempting not more than 3 questions from each bunch. Each question carries 5 marks each)

## Bunch 1(Problem Type)

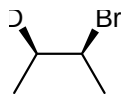
14. Write the mechanism of the following reaction with proper arrow notation.



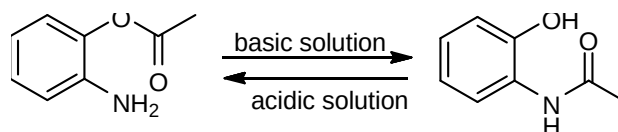
15. Write a mechanism for the substitution reaction.



16. The following alkyl bromide gives both cis and trans-2-butene upon reaction with sodium ethoxide. Only one of these alkenes retains the deuterium label. Draw both the products and explain why only one is deuterated?

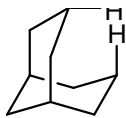


17. This reaction goes in one direction in acidic solution and in the other direction in basic solution. Draw mechanism and explain why the product depends on the conditions?

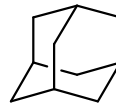


**Bunch 2 (Short Essay Type)**

18. Comment on the strain in the configuration of bicyclo[3.3.1]nonane system shown below. How is it related with adamantane?

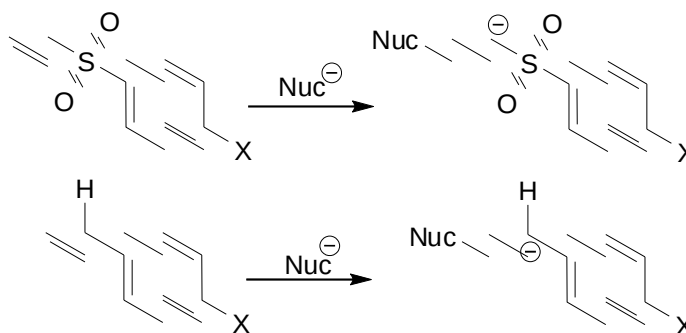


Bicyclo[3.3.1]nonane

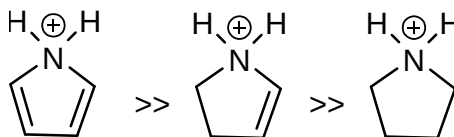


Adamantane

19. In nucleophilic addition to substituted alkenes, why  $\rho$  values are larger when the substituent is aryl as compared to arylsulfonates substituents.



20. a. Explain the trend in acidities



- b. Explain the reasons why phenol is more acidic than cyclohexanol?

21. Draw a full orbital diagram for all the bonding and antibonding  $\pi$  orbitals in the three-membered cyclic cation shown here. The molecule is obviously very strained. Might it survive by also being aromatic?



(5 x 5 = 25)

**Section C***(Answer any 2 questions. Each question carries 15 marks)*

22. Explain with suitable example how each of the following effects influence the acidity of various alcohols.

- a) Hybridization,
  - b) Electrostatics,
  - c) Induction,
  - d) Resonance and
  - e) Solvation.
23. Give a detailed description of the application of NMR spectroscopy on the different types of diastereotopic ligands with appropriate examples.
24. a) Draw a Jablonski diagram depicting all the photophysical processes with a brief explanation.
- b) Discuss in detail the Norrish reaction of ketones.
25. a) Describe the different conformations possible in cyclohexane in an energy profile diagram depicting the relative stability of each one with suitable explanation.
- b) Predict which product would be formed on opening these epoxides with cyanide ion (a nucleophile)?

(2 x 15 = 30)

\*\*\*\*\*