

**M. SC. CHEMISTRY EXAMINATION, 2022**

( 4th Semester )

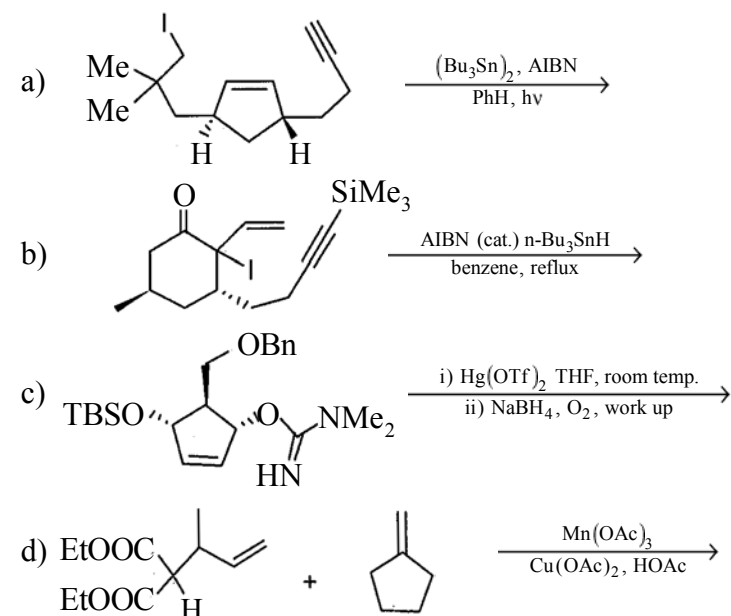
**ORGANIC CHEMISTRY SPECIAL****PAPER – XIII-O**

Time : Two hours

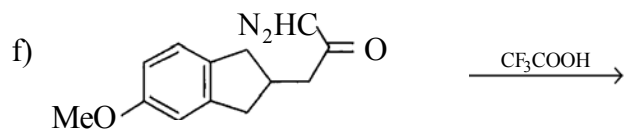
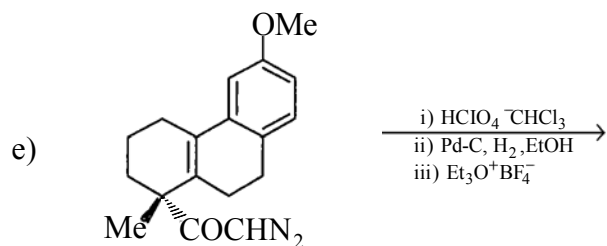
Full Marks : 50

**(25 marks for each unit)****Use a separate answer script for each Unit.****UNIT: O-4131**

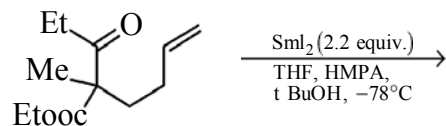
1. Predict the product(s) with proper stereochemistry in the following reactions and explain their formation with plausible mechanism (answer any *four*): 4×4



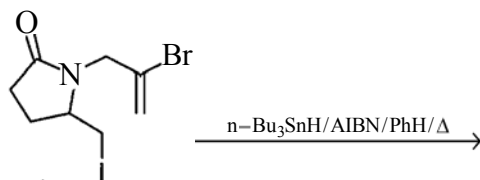
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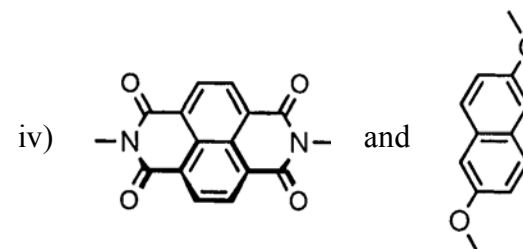
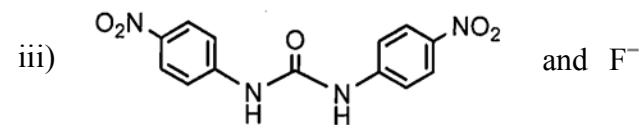
2. a) Discuss the drawbacks of the use of reagent  $\text{Bu}_3\text{SnH}$  in radical cyclization reaction. Give an example of environment friendly reagent which can be used in place of  $\text{Bu}_3\text{SnH}$ . 2+1
- b) Identify the major product with probable mechanism. Discuss the role of HMPA in the reaction given below. 2+1



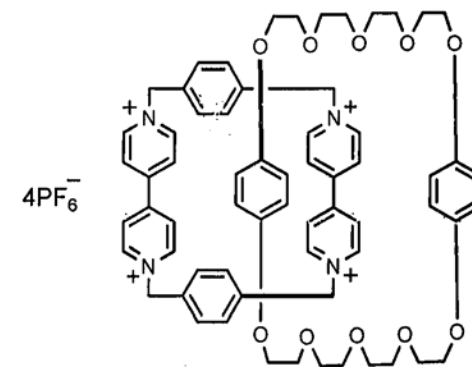
- c) Predict the products with plausible mechanism. Identify the major product and justify your answer. 2+1



[ 5 ]



6. a) Draw the preferred mode of  $\pi$ -stacking interaction between two benzene molecules. 2
- b) How will you synthesize a coumarin derivative using an anion- $\pi$  based supramolecular catalyst? 2
- c) Write down a suitable template directed synthetic route of the following catenane molecule? 2



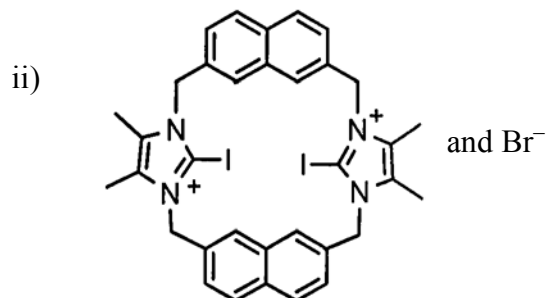
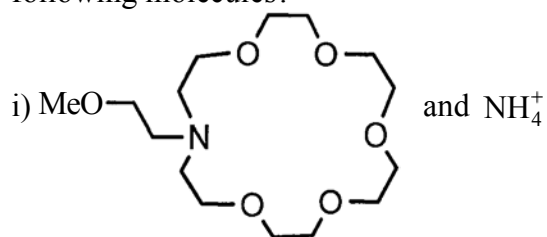
[ 4 ]

of 4-substituted-2, 6-dimethylbenzoyl chlorides in moist  $\text{CH}_3\text{CN}$  was +1.20. However, when the reaction was conducted in  $\text{HClO}_4$  the  $\rho$  value was found as -3.90. Explain the mechanism of the above two hydrolysis reactions. 2

d) Dissociation of 4-substituted phenylphosphonic acid exhibits  $\rho$  value 0.76 in  $\text{H}_2\text{O}$  at  $25^\circ\text{C}$  and 0.99 in 50%  $\text{EtOH}$  at  $25^\circ\text{C}$ . Why the  $\rho$  value increases from  $\text{H}_2\text{O}$  to 50%  $\text{EtOH}$ ? 2

4. What are mechanically interlocked molecules? What are the strategies will you use to synthesize rotaxanes? Give one example of cyclodextrin-based rotaxane molecule. Draw the structure of a pH-sensitive molecular shuttle. 1+1+1+1

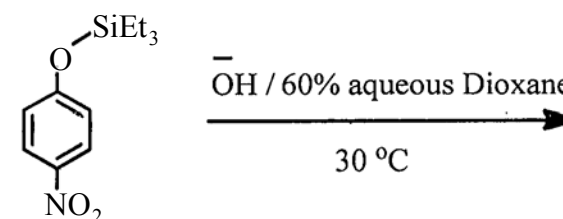
5. What types of noncovalent interactions present in the following molecules? 1+1+1+1



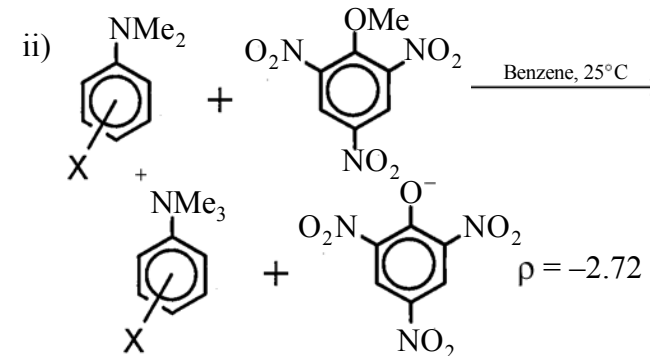
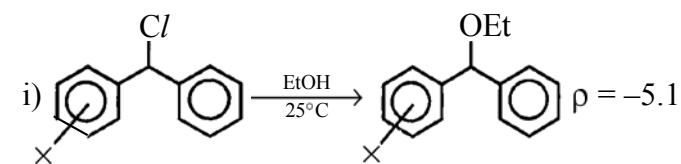
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**UNIT: O-4132**

3. a) Base-catalyzed hydrolysis of the following reaction exhibits ' $r = 0.5$ ' and ' $\rho = +3.52$ '. Write down Yukawa-Tsuno equation and explain the hydrolysis mechanism. 2+1



b) Write down the mechanism for the product formation of the following reactions with the help of  $\rho$  value. 2×2



c) The  $\rho$  value obtained from a  $\sigma$ -plot of the hydrolysis

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