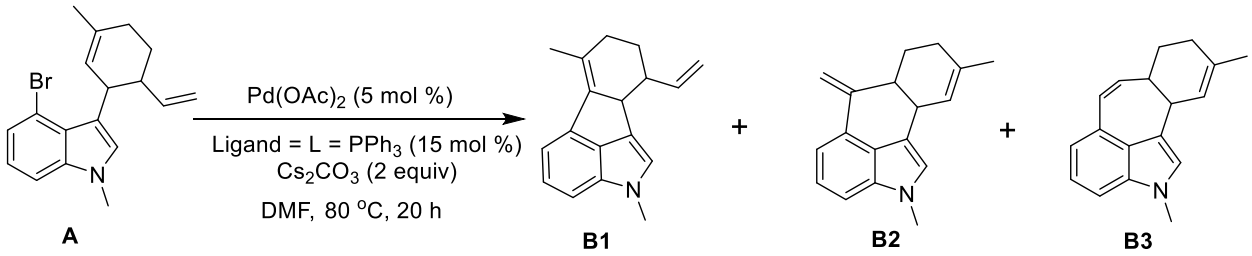
Birla Institute of Technology & Science, Pilani, Rajasthan 333 031
First Semester 2023-2024
COMPREHENSIVE EXAMINATION, OPEN BOOK
CHEM F311, ORGANIC CHEMISTRY-III

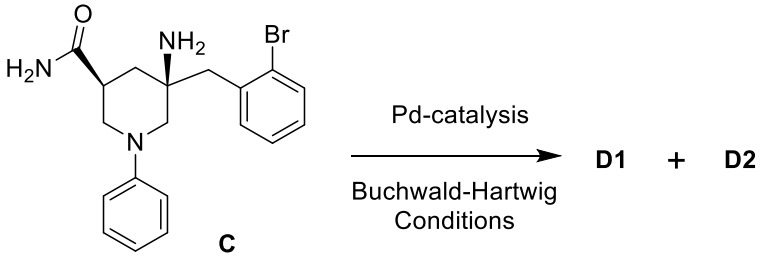
Time: 180 Minutes **Max. Marks: 90** **Date: 16/12/23**

All questions are compulsory. Answer the sub-parts of a question together.

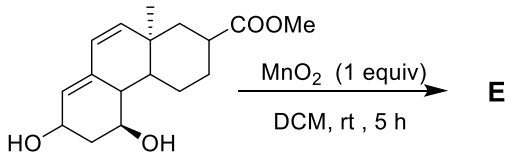
Q. No. 1. (i). Pd-catalyzed intramolecular cyclization in compound **A** yields three products **B1**, **B2**, **B3** in varying yields. Propose a detailed mechanism for the formation of the three products. [6]

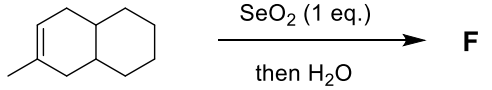


(ii). Pd-catalyzed Buchwald–Hartwig intramolecular cyclization in compound **C** gives two spiro-products **D1**, **D2** in 63% and 22%, respectively. Identify the structures of **D1** and **D2**. [2+2]



Q. No. 2. Identify the structures of **E-N** *(with correct stereochemistry, wherever applicable*) for the following transformations. (*No mechanism required*) [10x1.5=15]

(i).


(ii).


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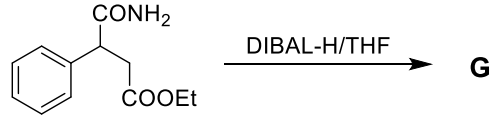
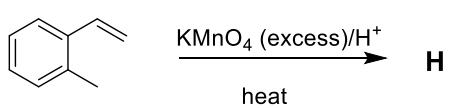
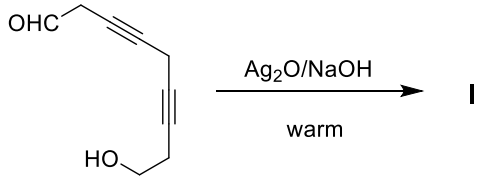
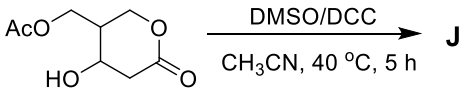
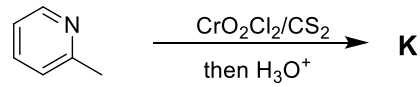
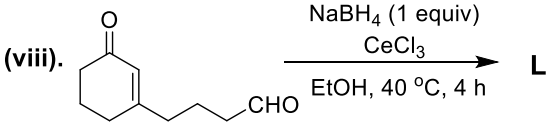


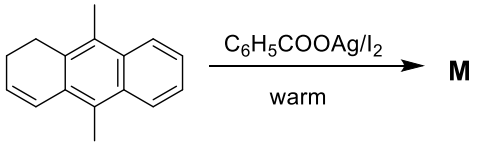
(iv).


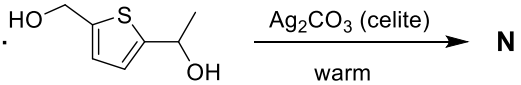
(v).


(vi).


(vii).


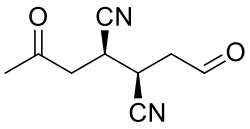
(viii).


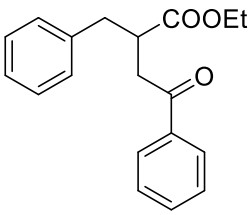
(ix).


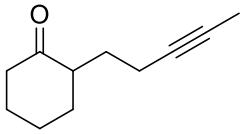
(x).


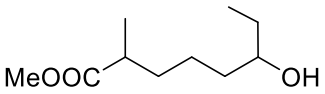
Q. No. 3. Suggest a retrosynthetic analysis for each of the following target molecules. In each case, identify the type of disconnection. Suggest suitable synthons and synthetic equivalents. Also, propose a logical forward synthesis for the target molecules. [9x6=54]

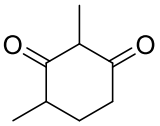
[Note: 4M for retrosynthetic analysis with labelling and 2M for forward synthesis for each molecule]

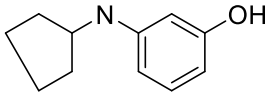
(i). 

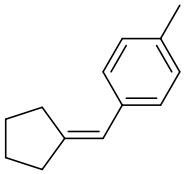
(ii). 

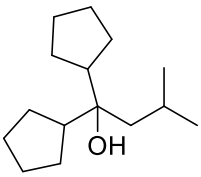
(iii). 

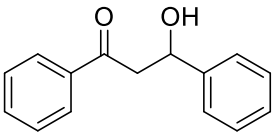
(iv). 

(v). 

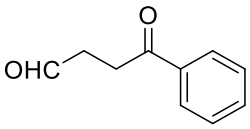
(vi). 

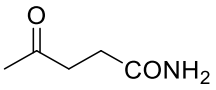
(vii). 

(viii). 

(ix). 

Q. No. 4. (i). Carry out the following synthetic conversions in not more than 4-5 steps showing all reagents/reactants involved. [4+4]

(a). Acetophenone ⟶ 

(b). Nitroethane ⟶ 

(ii). Write structures of three different synthetic equivalents of the following species? [3]