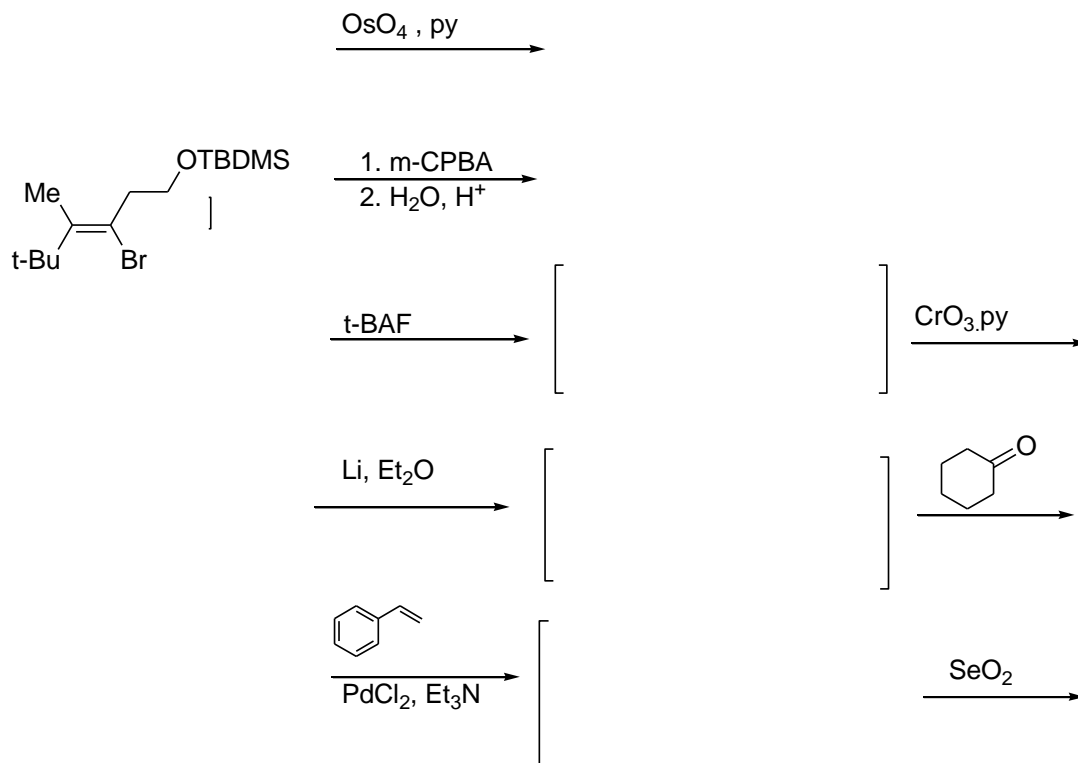
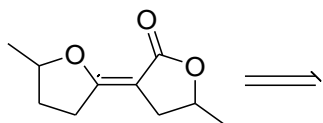


NOTE: Write your name and ID on the question paper. All questions are compulsory. The closed book part has to be handed over in the first two and a half hours. After that, you will receive the open book part which will be of 30 mins duration. The closed book part is of 80 marks while the open book is of 20 marks.

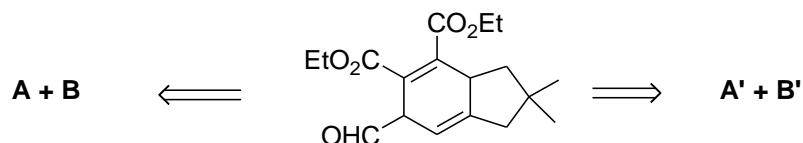
Q1 Write down the structures of the compound formed in each of the following reactions: [10]



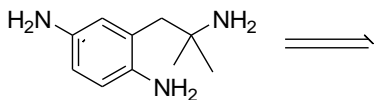
Q2(a) Show a simple one-step disconnection of the given compound. Also show its one-step synthesis. [5]



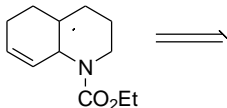
(b) The following molecule can be disconnected using a similar 4+2 cycloaddition strategy but the pair of synthons in each case are different. Identify the corresponding synthons. [5]



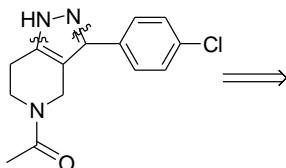
**Q3(a)** A common use of aliphatic and aromatic nitro-compounds is in the synthesis of amines. Keeping this in mind, suggest how the following amine can be disconnected starting with a FGI. And then show its synthesis. [8]



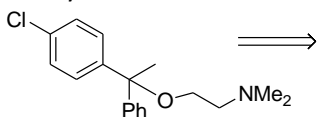
**(b)** Disconnect the following compound and show its corresponding synthesis. In the synthesis of the compound, 4+2 cycloaddition reaction is the last step. [8]



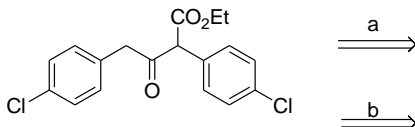
**(c)** Suggest a disconnection of the following heterocyclic compound starting with the disconnection as shown. Also describe its corresponding synthesis. [8]



**(d)** The following compound can be disconnected to chlorobenzene as the final compound. Show the disconnection and synthesis. [8]



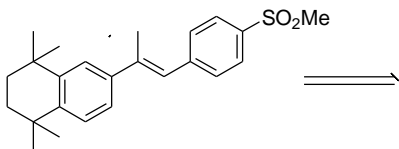
**(e)** The following molecule can be disconnected in two ways, both being diCO disconnections. Show both these one-step diCO disconnections. Which one would you prefer for synthesis and why? [8]



**Q4(a)** Complete the following disconnection. The last step involves two simultaneous disconnections ending at *t*-BuNH<sub>2</sub> and two other compounds. Also identify A and B. Provide the corresponding synthesis of the TM. [10]



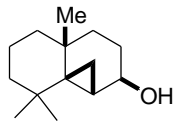
**(b)** The following compound can be disconnected via the central double bond to two synthons. The bigger synthon can be further disconnected by a Friedel-craft's acylation method and so on and so forth to finally end up at acetylene. Disconnect accordingly. Show the corresponding synthesis starting from acetylene. [10]



..... END OF CLOSED BOOK PART .....

**NOTE:** Write your name and ID on the question paper. Attempt both the questions. Answer the open book part in the question paper itself.

**Q1** Propose a reasonable retrosynthetic analysis for the following compound [Hint: start with looking for a disconnection to an  $\alpha,\beta$ -unsaturated ketone]: [10]



**Q2** Suggest a retrosynthesis of the testosterone molecule as shown below. [10]

