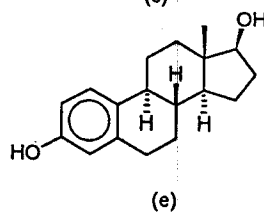
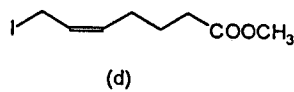
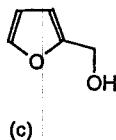
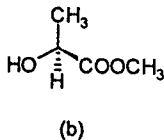
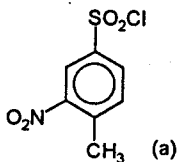


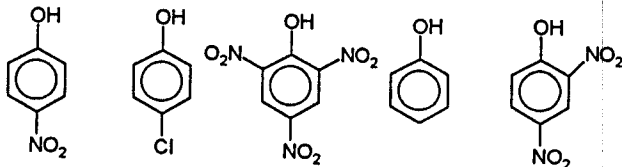
1. Draw the structures of the following compounds: (7.5%)

- cyclopropyl methyl ketone
- 2,6-diisopropyl-N,N-dimethylaniline
- 3-(4-hydroxyphenyl)propanoic acid
- 3-(2-hydroxyethylamino)-5,5-dimethyl-2-cyclo-hexen-1-one

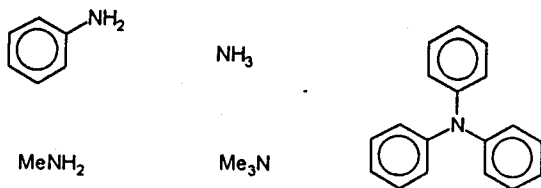
2. Name the following compounds: (7.5%)



3. Explain the acidity differences among the following phenols: (5%)



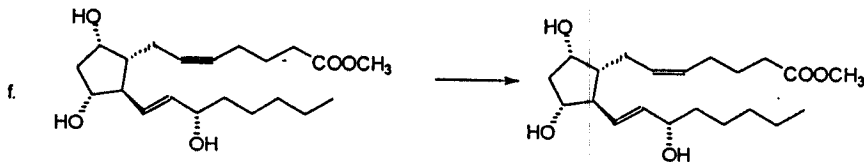
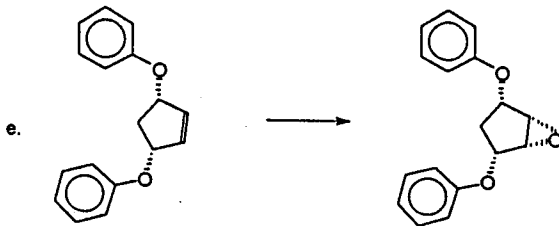
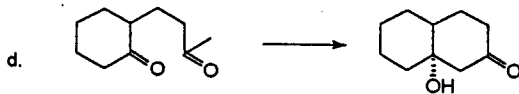
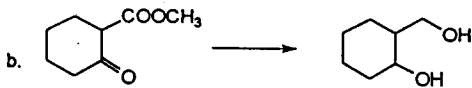
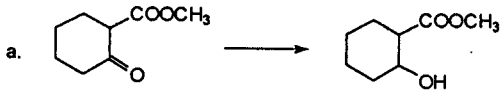
4. Explain the basicity differences among the following organic bases: (5%)



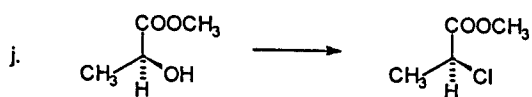
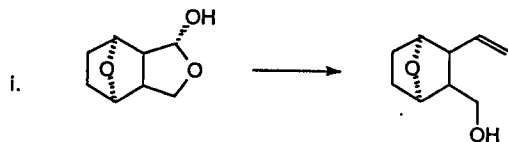
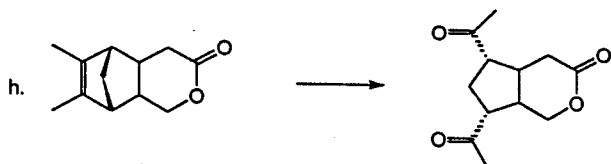
5. Give one example for each of the following reactions: (15%)

- Wittig reaction
- Baeyer-Villiger Oxidation
- Diels-Alder Reaction
- Curtius Rearrangement
- Friedel-Craft Alkylation

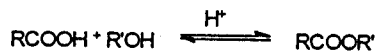
6. Provide reagents and reaction conditions for the following reactions: (20%)



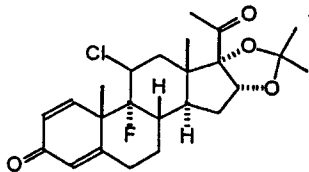
6.(continued)



7. What are the reaction mechanisms for acid catalysed ester hydrolysis and base catalyzed ester hydrolysis? (10%)

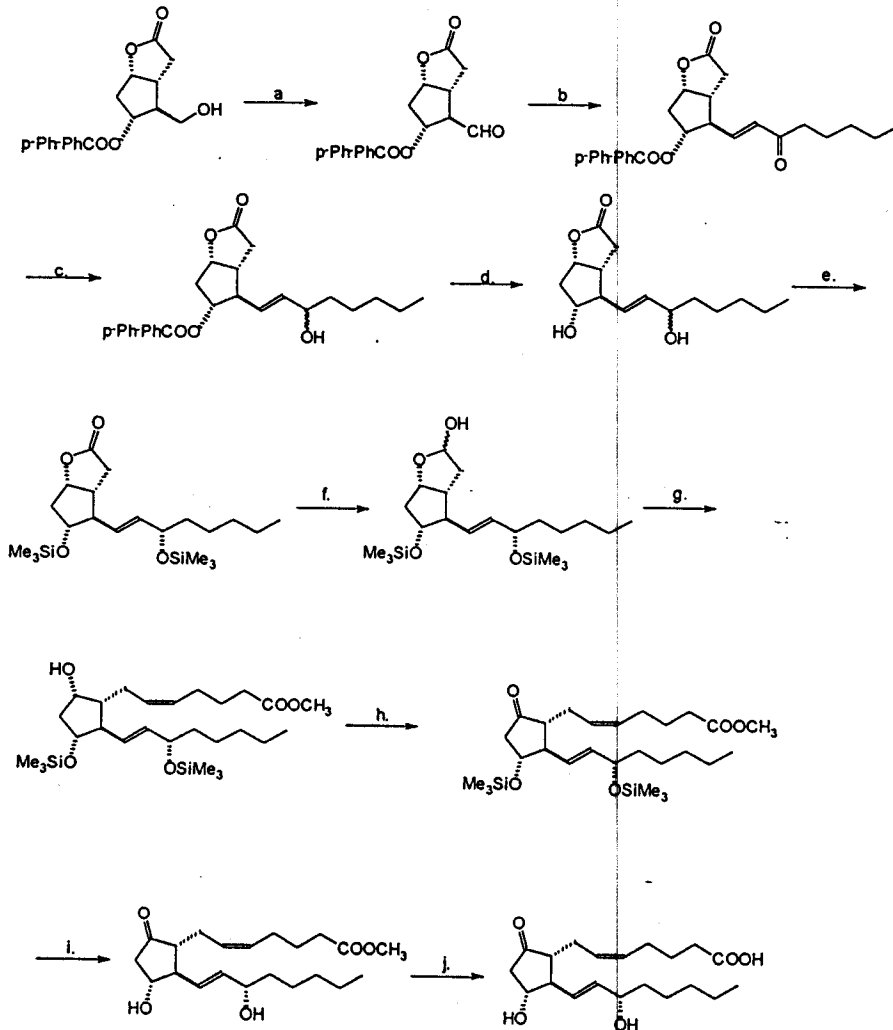


8. Flucoronide is a very potent glucocorticoid. Normally, it is not taken orally. If this drug is taken orally, do you expect this drug will remain unchanged in the stomach? If not, what is/are the probable degradative product(s) formed inside the stomach? (5%)



Structure of Flucoronide

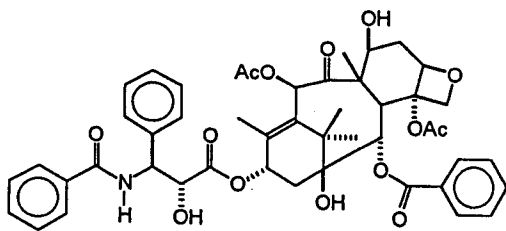
9. The following is the synthetic scheme of prostaglandin E₂:



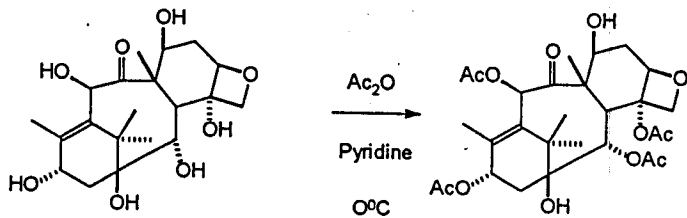
Some of the reaction conditions are listed below. Please provide reagents and reaction conditions for steps a, c, d, e, f, h, i, and j. (10%)

b. NaH, DMSO, (MeO)₂POCH₂CO(CH₂)₄CH₃
g. tBuOK, THF, Ph₃P(CH₂)₄COOH Br

10. Taxol is a natural product derived from *Taxus brevifolia*. It processes very interesting antitumor activities. Its structure is as follow:



- What are the hydrolysis products of taxol under mild basic conditions? (2%)
- A β -amino acid is formed from the above hydrolysis. Provide IUPAC name for this amino acid. (2%)
- When the aglycone was acetylated with acetic anhydride and pyridine, the following product is formed.



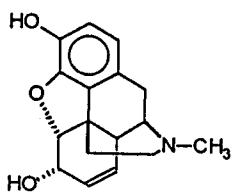
There were two hydroxyl groups could not be acetylated even with excess reagents. Why? (4%)

- The ultraviolet spectrum of taxol shows a maxima at 227 nm ($\epsilon=29800$). What is/are the functional group(s) involved in this UV absorption? (2%)

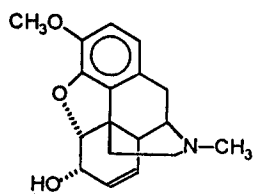
11. The following table shows the solubilities of codeine, heroin and morphine in water, dilute acid and dilute base.

	Codeine	Morphine	Heroin
Water	1g/120mL	1g/1.7L	1g/5L
Dilute Acid	insoluble	very soluble	
Dilute Base	very soluble	soluble	

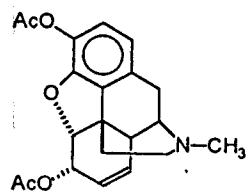
- Explain the differences in solubilities between codeine and morphine? (3%)
- When dissolving heroin in dilute acid or base, it is not recommended to warm the mixture to assist dissolution. Why? (2%)



Morphine



Codeine



Heroin