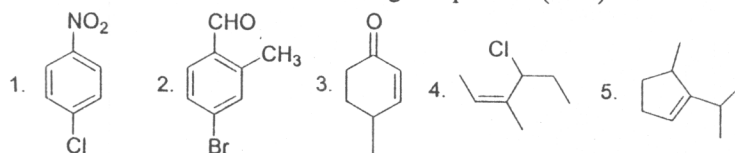


(1) Write IUPAC names for the following compounds. (10%)



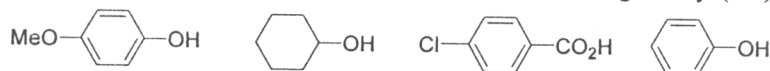
(2) Draw the structural formulas for the following compounds. (6%)

- (Z)-3-Methyl-2-hexen-1-ol
- 2-bromo-1-ethyl-4-nitrobenzene
- trans-3-Phenyl-2-propenal

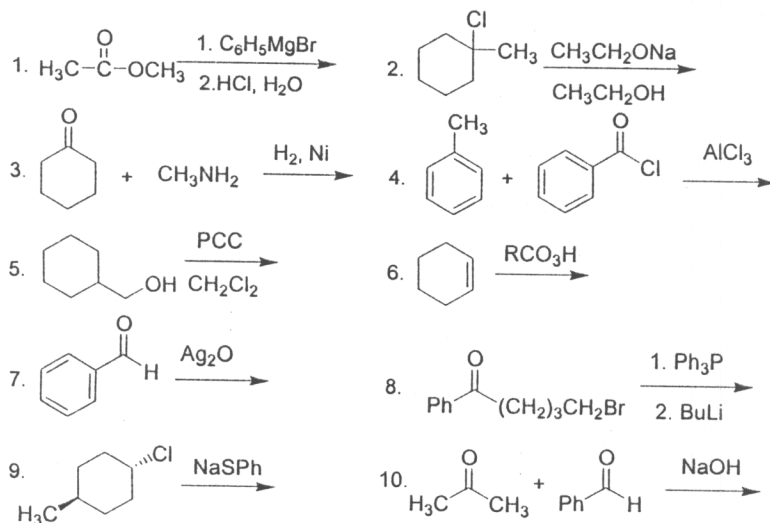
(3) For the aromatic electrophilic substitution reaction, methoxy group is an activating group and also an ortho-para director. Explain why? (3%)

(4) For the S_N1 reaction, the relative reactivity of alkyl halide is $3^\circ > 2^\circ > 1^\circ > \text{methyl}$. Explain why? (3%)

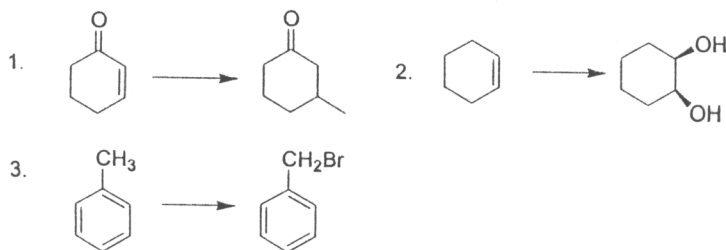
(5) Arrange the following compounds in the order of increasing acidity. (3%)



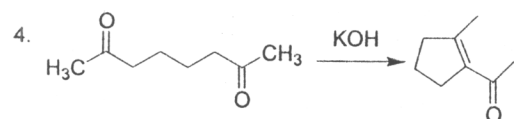
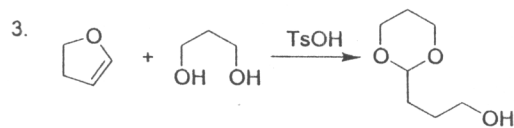
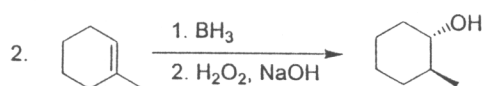
(6) Draw the structural formulas for the product of the following reactions. (30%)



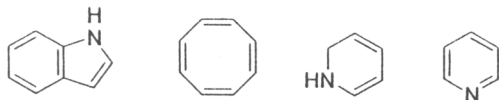
(7) Give the reagents for the following reactions. (9%)



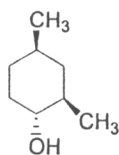
(8) Write a stepwise mechanism for the following reactions. (16%)



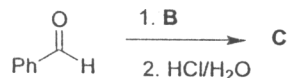
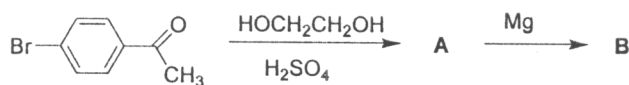
(9) Which of the following compounds are aromatic? Explain why? (8%)



(10) Draw the chair conformation for the following compound and state which chair is more stable. (2%)



(11) Provide structure for compounds A - C. (6%)



(12) Reaction of salicylaldehyde 1 and acetic anhydride in the presence of sodium acetate gives compound 2. Spectral data for compound 2 are collected below. Deduce the structure of 2.
Mass spectrum: $m/z = 146(M^+, 100\%)$; IR (Nujol): $1704\text{ cm}^{-1}(s)$; $^1\text{H NMR}$ (CDCl_3): δ 6.42 (d, $J = 9\text{ Hz}$, 1H), 7.23-7.35 (m, 2H), 7.46-7.56 (m, 2H), 7.72 (d, $J = 9\text{ Hz}$, 1H). (4%)

