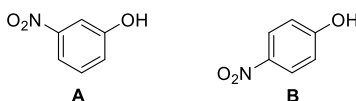**INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR**
B.TECH 1st SEM MID-SEMESTER (Group V−VIII) EXAMINATION, FEBRUARY 2022
Chemistry (CH1101)

Time: 45 Min.   **Full Marks: 30**
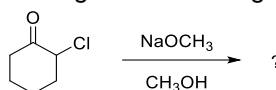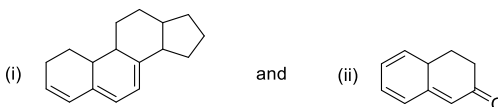   *Answer all questions*

1. (a) Which one is more acidic between **A** and **B** and explain.

    (b) Write the product of the following reaction and give the reaction mechanism.

    (c) State the Beer-Lambert Law of absorption of light and write it's limitations.
    (d) Calculate the λ_{max} (in nm) of the following compounds.

(i)   and   (ii)

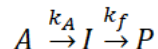   [2+3+2+(2×1½)]

2. (a) What are the essential criteria that a chelating agent must satisfy for being considered for chelation therapy? Suggest chelating agents for treatment of any two of the following:

    i) Pb(II), ii) Pu(IV), iii) As (III) toxicities.

    (b) Write down criterions of radioelement for using as radiodiagonostic agent and radiotherapeutic agent. Give examples of radionucleotides used as radiodiagonostic agent and radiotherapeutic agent.
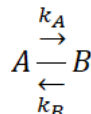
                                                                    [5+5]

3. (a) Consider the following sequential reaction scheme:
    $$A \xrightarrow{k_A} I \xrightarrow{k_f} P$$

    Assuming that only reactant A is present at t=0, what is the expected time dependence of [P] using the steady-state approximation?

    (b) Consider the inter-conversion of the two conformations of a species:
    $$A \underset{k_B}{\overset{k_A}{\rightleftharpoons}} B$$

    The reaction is first order in each direction, with an equilibrium constant of 10^4. The activation energy for the conversion of the B→A is 42 kJ mol^{-1}. Assuming an Arrhenius pre-exponential factor of 10^{12} s^{-1}, what is the expected observed reaction rate constant at 298K if one were to initiate this reaction starting with only the reactant A at initial condition?

                                                                    [6+4]