My Mom/Dad calls me ____________

Directions: This examination is in two parts. PART I consists of seven multiple choice questions (each worth 4 points). Circle the correct answer. PART II (72 points) involves questions of general nature requiring write-up on your part. Be brief, clear and to the point. Be sure to read each question carefully.

GOOD LUCK

RELAX, STAY CALM AND DO YOUR BEST

PART I: MULTIPLE CHOICE QUESTIONS (28 pts)

I. What would you expect to be the major product obtained from the reaction of 4-bromophenol with propene in the presence of HF?

(a) 2-propyl-4-bromophenol
(b) 3-propyl-4-bromophenol
(c) 4-propylphenol
(d) 3-isopropyl-4-bromophenol
(e) 2-isopropyl-4-bromophenol

II. Which of the following reactions would give the product(s) indicated?

(a) \( \begin{align*} \text{Ph} & \quad \text{O} \quad \text{CO} \quad \text{CH}_3 \\ \text{Br} & \quad \text{Fe} \\ \text{Ph} & \quad \text{O} \quad \text{CO} \quad \text{CH}_3 \end{align*} \)

(b) \( \begin{align*} \text{Ph} & \quad \text{NO}_2 \\ \text{HC} & \quad \text{H}_3 \\ \text{Ph} & \quad \text{NO}_2 \end{align*} \)

(c) \( \begin{align*} \text{Me} \quad \text{NH} \quad \text{CO} \quad \text{CH}_3 + \quad \text{Br}_3 & \quad \text{AlCl}_3 \\ \text{Ph} & \quad \text{NH} \quad \text{CO} \quad \text{CH}_3 \end{align*} \)

(d) all of these

(e) none of these
III. Which reaction below is correct?

(a) [Chemical reaction with structures and transformations]

(b) [Chemical reaction with structures and transformations]

(c) [Chemical reaction with structures and transformations]

(d) [Chemical reaction with structures and transformations]

(e) All of the reactions above are correct.

IV. What new compound is formed when 4-nitrobenzene diazonium chloride is treated with Sn and HCl?

(a) 4-Hydroxyphenylhydrazine
(b) 4-Nitrophenylhydrazine
(c) Phenylhydrazine
(d) 4-Aminobenzeneamine
(e) 4-Aminophenylhydrazine

V. A dimethylbenzene on mononitrtration yields only two mono-nitro derivatives. Hence the dimethylbenzene must be:

(a) 1,2 - dimethylbenzene
(b) 1,3 - dimethylbenzene
(c) 1,4 - dimethylbenzene
(d) none of the above
(e) More than one of the above.

VI. When conc. H₂SO₄ is used for the sulfonation of an aromatic compound, the crucial role of H₂SO₄ is which of the following?

(a) It removes the water formed in the sulfonation process.
(b) It participates in the formation of actual electrophile.
(c) The reaction is catalyzed by H₂SO₄.
(d) It provides the necessary low pH for the reaction.
(e) All of the above
VII. The product ‘p’ of the following reaction sequence is:

\[ \text{Product} \]

\[ \text{Product} \rightarrow \text{organic product} \rightarrow \text{Product} \]

(a) I  (b) II  (c) III  (d) IV  (e) V

PART II: WRITE-UP TYPE QUESTIONS

I. Predict the major organic product(s) for each of the following reactions. Specify stereochemistry wherever applicable. Write NR for no reaction.  
(21 pts.)

(1)  \[ \text{Product} + \text{Cl}_2 \text{SO}_2 \text{OH} \rightarrow \]

(2)  \[ \text{Product} + \text{Excess NaOH} \rightarrow \]

(3)  \[ \text{Product} + \text{NaOH/CHCl}_3 \rightarrow \]

(4)  \[ \text{Product} + 1. \text{NaNO}_2/\text{HCl, cold} \rightarrow 2. \text{phenol} \rightarrow \]
II. With chemical equations and in a stepwise manner, propose a reasonable mechanism for the following reactions: (Use back page if necessary.)

(1) \[
\text{[P 659, ch: 15]}
\]
III. Starting with benzene, any anhydride, and/or C1-C4 alkanols, and any inorganic reagents propose a practical laboratory synthesis for each of the following. Specify reaction conditions for each step you propose.

(1) \[ \text{(problem 15-54a)} \] (8pts)

(2) \[ \text{(homework problem)} \] (8pts)
(3) Give two synthetic routes for the preparation of P-methoxyaniline (prob. 15-52) (12pts)

IV. Explain why the following reaction leads to the products that are shown. (problem 12-58) (8 pts)

\[\text{NH}_2 \xrightarrow{\text{NaNO}_2, \text{HCl}} \text{OH} + \cdot\]