PART I: MULTIPLE CHOICE QUESTIONS (32 pts.)

1. How many nitriles with molecular formula C₅H₂N are possible?
   (a) One
   (b) Two
   (c) Four
   (d) Eight
   (e) None of the above

2. The correct IUPAC name for neopentylamine:
   (a) 2,2-dimethylpropylamine
   (b) 2,3-dimethylpropylamine
   (c) 1,2-dimethylpropylamine
   (d) 3-methyl-1-butylamine
   (e) none of the above

3. Which of the following(s) will include bicyclic compounds as isomers?
   \[
   \begin{array}{cccc}
   \text{C₅H₈} & \text{C₇H₁₄} & \text{C₅H₁₂} & \text{C₆H₁₀} \\
   1 & 2 & 3 & 4
   \end{array}
   \]
   (a) 1 and 3
   (b) 1 and 4
   (c) only 4
   (d) only 1
   (e) 1, 3 and 4

4. Select the structure of 4-ethyl-2,3-dimethyl-2-heptenoic acid

   \[
   \begin{array}{c}
   \text{(a) 1} \\
   \text{COOH} \\
   \text{1} \\
   \text{HOC} \\
   \end{array}
   \quad
   \begin{array}{c}
   \text{(b) 2} \\
   \text{COOH} \\
   \text{2} \\
   \text{HOOC} \\
   \end{array}
   \quad
   \begin{array}{c}
   \text{(c) 3} \\
   \text{COOH} \\
   \text{3} \\
   \text{HOOC} \\
   \end{array}
   \quad
   \begin{array}{c}
   \text{(d) 4} \\
   \text{COOH} \\
   \text{4} \\
   \text{HOOC} \\
   \end{array}
   \quad
   \begin{array}{c}
   \text{(e) 5} \\
   \text{COOH} \\
   \text{5} \\
   \text{HOOC} \\
   \end{array}
   \]
5. Heroin, an abused drug, has the structure

Which of the following functional group is not present in Heroin?
(a) Amine
(b) Ester
(c) Ether
(d) Aromatic ring
(e) Ketone

6. Which of the following is (are) secondary amine(s)?

(a) 1 and 3  (b) 2 and 3  (c) 3 and 4  (d) 3 and 5  (e) 4 and 5

7. The molecules shown are:

(a) Heterocyclic compounds
(b) Isomeric compounds
(c) Aromatic compounds
(d) Both a and b
(e) Both b and c
8. The drawings:

\[
\begin{align*}
\text{and} \\
\end{align*}
\]

are an example of:

(a) cis and trans isomers
(b) constitutional isomers
(c) conformational isomers
(d) both a and c
(e) none of the above

**PART II: WRITE UP TYPE QUESTIONS.**

1. Write IUPAC name for each of the following substances. (24 pts.)

<table>
<thead>
<tr>
<th>Structure</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Structure 1" /></td>
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<tr>
<td><img src="image2.png" alt="Structure 2" /></td>
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<tr>
<td><img src="image3.png" alt="Structure 3" /></td>
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<td><img src="image4.png" alt="Structure 4" /></td>
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<td><img src="image5.png" alt="Structure 5" /></td>
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<td><img src="image8.png" alt="Structure 8" /></td>
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</tbody>
</table>
II. Write **structural formula** for each of the following substances. (24 pts.)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Structural Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. m-Cresol</td>
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<tr>
<td>2. Allyl vinyl sulfide</td>
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<tr>
<td>3. 1-0x-3.5 cyclohexadiene-2-one</td>
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</tr>
<tr>
<td>4. Spiro [2.4]-1-heptene-5-ol</td>
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<tr>
<td>5. Acetic benzoic anhydride</td>
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</tr>
<tr>
<td>6. 5-nitroso-2-pentenenitrile</td>
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<tr>
<td>7. 5-oxo-3-pentenoic acid</td>
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<tr>
<td>8. 2-pentyn-4-enal</td>
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</tr>
</tbody>
</table>

III. Write and give a common name and IUPAC name for all the isomeric acyclic substances with M.F. C₃H₆O₂. (Draw structural formula for each) (20 pts.)

<table>
<thead>
<tr>
<th>Structural F.</th>
<th>Common Name</th>
<th>IUPAC Name</th>
</tr>
</thead>
<tbody>
<tr>
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