1. (20pts) You have isolated two types of hemoglobin from two different species that live together. You have characterized their O₂-binding affinity (as shown below). Explain any similarities or differences in these data.

<table>
<thead>
<tr>
<th></th>
<th>P₀</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species I</td>
<td>30</td>
<td>3.0</td>
</tr>
<tr>
<td>Species II</td>
<td>4</td>
<td>2.9</td>
</tr>
</tbody>
</table>

You have noticed that species I is more active (vigorous) at high O₂ than species II, but the opposite is true at low O₂ tension. Speculate as to why this may be true. Use the information in the first part of this problem as a basis for your explanation. Draw \( \bar{y} \) versus P O₂ for each species.

2. (10pts) For the energy level diagram shown below, choose the correct relationship. (circle correct one)

(a) \( \text{Keq} > 1; \text{Keq} < 1; \text{Keq} = 1 \)
(b) \( \Delta G_i^* > 0; \Delta G_i^* < 0; \Delta G_i^* = 0 \)
(c) \( k_i > k; k_i < k; k_i = k \)
(d) \( \Delta G_i > \Delta G_i^*; \Delta G_i < \Delta G_i^*; \Delta G_i = \Delta G_i^* \)
3. (15pts) You are studying a biochemical reaction: \( A \rightleftharpoons B \), with and without the presence of protein E. You have gathered the following kinetic and thermodynamic (equilibrium) data. Is E an enzyme? Explain.

<table>
<thead>
<tr>
<th></th>
<th>( K_{eq} )</th>
<th>( k_1 )</th>
<th>( k_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without E</td>
<td>100</td>
<td>( 10^5 )</td>
<td>( 10^3 )</td>
</tr>
<tr>
<td>With E</td>
<td>10000</td>
<td>( 10^6 )</td>
<td>( 10^3 )</td>
</tr>
</tbody>
</table>

4. (15pts) Name two reagents that are added to proteins which are about to be electrophoresised to determine their size. Give the purpose for each of these reagents.

A protein of 40 KD is contaminated by another protein of 5 KD. Name a method that can be used to separate these two proteins. Explain this method briefly.

5. (15pts) The DNA double helix unfolds with low salt concentration, but it is stable at high salt concentrations. At 10mM NaCl, there is 50% double helix and 50% unfolded species. Show the expected unfolding curve. Absorbance at 260nm is used to monitor this process.
6. (10pts) Write a chemical equation that summarizes the extention of an existing piece of DNA, (DNA)n, by one nucleotide.

Repeat for the synthesis of RNA.

7. (15pts) Show the reaction that converts ribose to deoxyribose in nucleotide biosynthesis.

Name four ways that metabolic processes can be regulated.
I.

1. Describe the effects of radiation on oral and paraoral tissues. (15%)
2. Describe the clinical findings in the oral cavity of patients involved leukemia (10%)
3. Describe the methods to detect the disease of salivary gland. (10%)
4. List 5 malignant tumors and 5 benign tumors occurred in the oral soft tissue. (15%)

II. 選擇題 (20%)

1. 乾性齒槽(Dry socket)未見的現象:
   a. 疼痛   b. 臭味   c. 化膿   d. 血腫分解
2. 重症肌無力,鏡下變化:
   a. 常無明顯變化 b. 肌肉增生 c. 肌肉肥大 d. 肌肉急性發炎
3. 灼痛(causealgia)常發生於:
   a. 牙周炎後 b. 牙周病 c. 牙齦炎 d. 牙周變性
4. 軟組織修復的第一步:
   a. 形成血塊 b. 發炎 c. 纖維化 d. 肌化
5. 下列何者,不是肉芽組織中的成分:
   a. 微血管 b. 發炎細胞 c. 膠原纖維 d. 脂肪
6. 三叉神經痛是影響:
   a. 緊張枝 b. 感覺枝 c. 神經元 d. 突觸
7. 易受重症肌無力影響的肌肉:
   a. 胸肌 b. 腰肌 c. 外眼肌 d. 二頭肌
8. 下頜門齒引起的間隙感染,以下列何者較有可能:
   a. 前頜頜間隙 b. 咀嚼頜間隙 c. 腦頜頜間隙 d. 下頜頜間隙
9. 鱷魚淚(Crocodile tears)是描述下列何種病:
   a. 口舌感覺倒錯 b. 耳內神經綜合病徵 c. Bell’s 麻 d. 三叉神經痛
10. 被篩細胞學檢查報告 class I(第一級),表示存在:
    a. 正常細胞 b. 小量異形細胞 c. 原位癌 d. 癌

問題題 (30%)

1. 參考世界衛生組織,關於牙源性腫瘤(odontogenic tumor)的組織分類包含那些腫瘤: