INSTRUCTIONS: ANSWER ANY TWO QUESTIONS   TIME: 2 HOURS

1. a. The effect of an inhibitor, I, on the rate of a single-substrate catalyzed reaction was investigated and gave the following results as indicated in the table below
   - i.   Using appropriate transformation
   - ii.   Determine what type of inhibition is exhibited   **(10 marks)**
   - iii. Construct an enzyme substrate plot
   - iv.   Determine the K_i, K_m and V_{max} **(10 marks)**

[Substrate] (mmol/L)	Inhibitor concentration (mmol/L)		
	0	1.5	3.0
Rate of reaction v_o (moles/L/min)			
0.05	0.33	0.20	0.14
0.1	0.50	0.33	0.25
0.2	0.67	0.50	0.40
0.4	0.80	0.67	0.57
0.5	0.83	0.71	0.63

   b. Mention 5 industrial enzymes and their applications   **(5 marks)**
   c. Explain in details the mechanisms that exists for enzymatic catalysis   **(5 marks)**

2. a. Discuss in detail the principles of enzyme classification and nomenclature   **(5 marks)**
   b. Briefly explain why enzymes differ from ordinary chemical catalysts   **(5 marks)**
   c. Using the diagnostic double reciprocal plots, differentiate the different types of enzyme inhibition   **(5 marks)**

d. Discuss briefly the effect of temperature, pH and inhibitors on enzyme activity **(5 marks)**

e. Discuss the catalytic mechanism of either carbonic anhydrase or ribonuclease **(10 marks)**

3. **a.** Using **BOTH the** steady state and equilibrium approach derive the Michealis-Menten equation

(10 marks)

b. The enzyme cellulase obtained from the giant African land snail with a K_m of 4.5 mmol/L was assayed at the following substrate concentration (i) 1.5 mmol/L(ii) 2.8 mmol/L (iii) 3.9 mmol/L (iv) 4.0 mmol/L and (v) 5.1 mmol/L. If the initial velocity observed at 5.1 mmol/L was 2.1mmol/L/min.

i.   Calculate the **initial velocities** at the other substrate concentrations **(12 marks)**

ii.   What major assumption did you make before arriving at your answers **(3 marks)**

c. Using appropriate illustration discuss the theories of "lock and key" and "induced fit" for enzyme catalysis **(5 marks)**