INSTRUCTIONS: ANSWER ANY THREE QUESTIONS   TIME: 2 HOURS

1. (a)   Derive the Michealis-Menten equation using **BOTH** steady state and equilibrium
         approach   **(10marks)**
   (b)   Discuss suicide inhibition using specific examples   **(5 marks)**
   (c)   An enzyme has a K_m of 1.5×10^{-4}M. If the V_{max} of the preparation is 37 μmoles/L/min,
         what velocity will be observed in the presence of 1.0×10^{-4}M substrate and 2×10^{-4} M of
         (a) competitive inhibitor
         (b) a non-competitive inhibitor and
         (c) uncompetitive inhibitor?

         The K_i in all three cases is 3.5×10^{-5} **(15 marks)**

2. (a)   Determine the K_m, V_{max} and K_i for the following enzyme-catalyzed reaction using the
         data presented in the table below. Also, determine the type of inhibition   **(20 marks)**

S (mmol/L)	(v_o) μmoles/L/min Control (0)	(v_i) μmoles/L/min + 0.5 mmol/L inhibitor	(v_i) μmoles/L/min + 1.0 mmol/L inhibitor
0.1	0.33	0.2	0.14
0.2	0.50	0.33	0.25
0.4	0.67	0.5	0.40
0.8	0.80	0.67	0.57
1.0	0.83	0.71	0.63

   (b)   Discuss in detail, the mechanisms for enzymatic catalysis   **(5 marks)**

   (c)   Discuss the mechanism of catalysis of the any one of the following; chymotrypsin or
         Lysozyme
                                                                             (5marks)

3. (a)   From the equation of rate of reaction for a bisubstrate reaction mechanism which is
         ordered sequential, determine how the real kinetic parameters such as K_{ia}, k_m^B, k_m^A and
         V_{max} will be obtained
                                                                             (15 marks)
   (b)   Discuss briefly, the effect of pH, inhibitors and temperature on enzyme catalysis

                                                                             (8 marks)
   (c)   Discuss extensively, the applications of enzymes
                                                                             (7 marks)

4. The following velocity data were obtained. Determine the nature of each inhibitor and calculate the K_i **(30 marks)**

Initial velocity (nmoles/min)

[S] (M)	Control	+I at 10 mM	+Z at 40 mM	+M at 5 mM	+N at 0.4 mM
0.4	16.67	6.250	5.56	10.00	8.89
0.5	20.00	7.690	6.67	11.11	10.81
0.6	24.98	10.00	8.33	12.50	13.78
1.0	33.33	14.29	11.11	14.29	19.05
2.0	50.00	25.00	16.67	16.67	30.77
4.0	66.67	40.00	22.22	18.18	44.44
5.0	71.4	45.45	23.81	18.52	48.78

5. (a) Briefly discuss the mechanistic basis of enzyme-targeted drugs **(10 marks)**
   (b) Derive the equation for the rate of reaction for competitive enzyme inhibition **(10 marks)**
   (c) Discuss briefly, enzyme nomenclature and classification **(10 marks)**