

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026***Fifth Semester**Chemical Engineering***CH3015 – Enzyme Immobilisation Technology***Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BTL</i>	<i>CO</i>	<i>Marks</i>
1.	Define the term 'Biocatalysis'.	L1	1	2
2.	List any four classes of enzymes as per the IUBMB classification system with one example each.	L1	1	2
3.	State the Michaelis-Menten equation.	L1	2	2
4.	What is meant by competitive inhibition?	L2	2	2
5.	Name the four major techniques used for enzyme immobilization.	L1	3	2
6.	Differentiate between adsorption and covalent binding methods of immobilization.	L2	3	2
7.	Define the 'Thiele Modulus'.	L1	4	2
8.	What is the 'Effectiveness Factor' in immobilized enzyme kinetics?	L2	4	2
9.	List any two industrial applications of immobilized enzymes.	L1	5	2
10.	Identify the type of reactor best suited for substrate-inhibited reactions.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i List and define the six main classes of enzymes as per the IUBMB nomenclature. Provide two examples of reactions catalyzed by enzymes from each class.	L2	1	8
	ii Explain the various steps involved in the synthesis, recovery, and purification of enzymes from microbial sources for industrial use.	L2	1	8
	Or			
	b Explain the concept of 'biocatalysis' and how it differs from traditional chemical catalysis. Discuss why enzymes are considered superior process catalysts in specific industrial applications.	L2	1	16
12.	a i Develop the Briggs-Haldane equation under steady state conditions.	L3	2	8
	ii Derive the Michaelis-Menten equation using the steady-state assumption. Calculate the K_m and V_{max} values from given experimental data of $[S]$ and V_0 .	L3	2	8
	Or			
	b Identify and explain the effects of competitive, non-competitive, and uncompetitive inhibition on the kinetic parameters K_m and V_{max} . Use Lineweaver-Burk plots to illustrate your analysis.	L3	2	16

13.	a i	Explain the four primary methods of enzyme immobilization. For each method, name one common support matrix or reagent used.	L2	3	8
	ii	Explain the principle behind the 'adsorption' method of immobilization. Discuss its major advantages and disadvantages compared to other techniques.	L2	3	8
Or					
	b	Discuss in detail about entrapment and encapsulation method of immobilization.	L2	3	16
14.	a	Describe about immobilized enzyme kinetics with reference to external film diffusion and internal pore diffusional kinetics.	L2	4	16
	Or				
	b	Explain the effect of electrostatic potential of the micro environment.	L2	4	16
15.	a	Describe the design and operating principles of two main types of immobilized enzyme reactors: Packed Bed Reactors (PBR) and Continuous Stirred-Tank Reactors (CSTR).	L2	5	16
	Or				
	b i	Explain about the advantages of using immobilized enzymes over free enzymes in large scale production of high fructose corn syrup (HFCS).	L2	5	8
	ii	Discuss about application of immobilized enzymes in fertilizer industries.	L2	5	8