Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. END SEMESTER EXAMINATIONS NOV 2018

SUBJECT: INTRODUCTION TO BIOCHEMICAL ENGINEERING

PE I [CHE 4018]

REVISED CREDIT SYSTEM
(26/11/2018)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer **ALL** the questions.

❖ Missing data may be suitable assumed.

1A.	Explain the cyclization of d-glucose thereby discuss about Fischer and Haworth projections.	05
1B.	Discuss about the different types of membrane phospholipids with example.	03
1C.	Write a short note on bacterial flagella with pictorial representation	02
2A.	The kinetics of an enzyme were analyzed in the absence of inhibitors, as well as in the presence of Inhibitor A and Inhibitor B. Using the given data below, construct or calculate the following: <table><tr><td>[S] mM</td><td>Without inhibitor V_0 (mmol/min)</td><td>Inhibitor A V_1 (mmol/min)</td><td>Inhibitor B V_2 (mmol/min)</td></tr><tr><td>3</td><td>3.90</td><td>2.40</td><td>1.29</td></tr><tr><td>6</td><td>6.00</td><td>3.60</td><td>2.40</td></tr><tr><td>12</td><td>8.40</td><td>5.10</td><td>3.90</td></tr><tr><td>24</td><td>10.8</td><td>6.60</td><td>6.30</td></tr><tr><td>36</td><td>12.0</td><td>7.20</td><td>8.55</td></tr></table> (i) Determine K_M and V_{max} in the presence and absence of inhibitors. (ii) Determine the type of inhibitors A and B (iii) Also state whether the effects of the inhibitors A and B be over ridden by adding more substrate.	07
2B.	Write a short note on positive and negative cooperativity with suitable example.	03

3A.	Explain the metabolic pathway which results in the formation of pyruvates from a glucose molecule.	**06**
3B.	Discuss about the synthesis of ATP molecules by electron transport chain.	**04**
4A.	Derive an expression to determine the reaction time required for a single cell-substrate system in a batch bioreactor, if the kinetics of substrate consumption follows Michaelis-Menten equation.	**05**
4B.	Discuss about the steps involved in receptor mediated endocytosis with a schematic representation	**05**
5A.	Write a short note on prey-predator model. Also derive Lotka-Volterra equation to prove the stability of the prey-predator system.	**08**
5B.	Derive an expression for doubling time during exponential phase in a batch reactor.	**02**

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