

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

Ph.D.-I Semester (BT/BI)

COURSE CODE (CREDITS): 24 P1WBT231 (2)

MAX. MARKS: 25

COURSE NAME: Biochemical Calculations

COURSE INSTRUCTORS: Dr. Poonam Sharma

MAX. TIME: 1 Hour 30 min

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems. Calculators are allowed.

Q.No	Question	Mark s														
Q1(a)	Explain basic reaction theory and its fundamentals.	3														
(b)	Discuss the effect of temperature on reaction rate.	4														
Q2(a)	An enzyme with a K_m of 0.06 mmol/L hydrolyzed a substrate of a concentration 0.03 mmol/L. The initial velocity of the reaction was 0.0015 mmol/L.min ⁻¹ . Calculate the substrate concentration which gives an initial velocity of 0.003 mmol/L.min ⁻¹ .	3														
(b)	Explain how non-ideal solutions show deviations from ideal behavior.	3														
(c)	Describe the osmosis in blood cells	2														
Q3(a)	Initial rate data is listed below. Calculate V_{max} and K_m <table><tr><th>Fructose concentration (mol l⁻¹ X 10⁻²)</th><th>Initial reaction velocity (mol l⁻¹ min⁻¹ X 10³)</th></tr><tr><td>2.50</td><td>1.94</td></tr><tr><td>2.27</td><td>1.91</td></tr><tr><td>1.84</td><td>1.85</td></tr><tr><td>1.35</td><td>1.80</td></tr><tr><td>1.25</td><td>1.78</td></tr><tr><td>0.730</td><td>1.46</td></tr></table>	Fructose concentration (mol l ⁻¹ X 10 ⁻²)	Initial reaction velocity (mol l ⁻¹ min ⁻¹ X 10 ³)	2.50	1.94	2.27	1.91	1.84	1.85	1.35	1.80	1.25	1.78	0.730	1.46	5
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(b).	Absolute or 100% ethanol is produced from a mixture of 95% ethanol and 5% water using the Keyes distillation process. A third component, benzene, is added to lower the volatility of the alcohol. Under these conditions, the overhead product is a constant-boiling mixture of 18.5% ethanol, 7.4% H ₂ O and 74.1% benzene. Use the following data to calculate the volume of benzene which should be fed to the still in order to produce 250 litres of Absolute ethanol: (density 100% alcohol = 0.785 g cm ⁻³) ; (density benzene = 0.872 g cm ⁻³).	5														