



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
School of Health Sciences

End Semester Examination, December 2021

Programme Name: B.Tech. Food Tech
Course Name : Nutrition Biochemistry
Course Code : HSFT 2003
Nos. of page(s) : 4

Semester : 3rd
Time : 3 hour
Max. Marks : 100

Instructions : All questions are compulsory

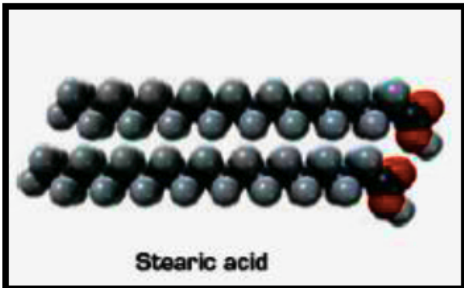

SECTION A (Type answers in text box)

		Marks	CO
Q1	Select one of the following that is not correct A. Enzyme lower activation energy of a reaction B. The presence of an enzyme has no effect on ΔG° C. Covalent catalysis is employed by some enzymes to provide an alternative reaction pathway D. Enzyme often lower the activation energy by destabilizing transition state intermediates	1.5	CO4
Q2	Conversion of L-threonine to L-isoleucine by threonine dehydratase operates by: a. Feedback regulation b. Feedback inhibition c. Allosteric regulation d. Covalent regulation	1.5	CO4
Q3	When the velocity of enzyme activity is plotted against substrate concentration, which of the following is obtained? a) Hyperbolic curve b) Parabola c) Straight line with positive slope d) Straight line with negative slope	1.5	CO4
Q4	Which of the following is not a reducing sugar? A. Erythrose B. Sucrose C. Galactose D. Ribose	1.5	CO2
Q5	Which of the following will provide the main fuel for muscle contraction during short term maximum exertion? A. Plasma glucose	1.5	CO2

	<p>B. Muscle glycogen C. Plasma nonesterified fatty acid D. Muscle reserves of triacylglycerol</p>		
Q6	<p>What is the general term used for the anaerobic degradation of glucose to obtain energy? a) Anabolism b) Oxidation c) Fermentation d) Metabolism</p>	1.5	CO2
Q7	<p>A blood sample is taken from a 25-year-old man after he has eaten 3 slices of toast and a boiled egg. Which one of the following will be at higher concentration than if the blood sample had been taken after an overnight fast? a. Non-esterified fatty acid. b. Glucagon. c. Glucose. d. Ketone bodies.</p>	1.5	CO1
Q8	<p>Bomb calorimeter is used to determine calorific value of food at constant: a. Temperature b. Pressure c. Volume d. None of the above</p>	1.5	CO1
Q9	<p>Rickets is a disorder caused due to dietary deficiency of a. Sodium b. Potassium c. Calcium d. Magnesium</p>	1.5	CO4
Q10	<p>Amino acid that is known as alpha-helical inducer in proteins: a. Glycine b. Alanine c. Leucine d. Proline</p>	1.5	CO3
Q11	<p>Number of essential amino acids for human are a. 7 b. 8 c. 9 d. 10</p>	1.5	CO3
Q12	<p>The secondary structure of proteins describe: a. How groups of amino acids fold locally b. How two proteins bind/fold with each other c. The amino acid sequence d. How secondary structural units fold together</p>	1.5	CO3
Q13	<p>Phosphorylase is a: a. Ligase b. Transferase c. Lyases d. Hydrolases</p>	1.5	CO4
Q14	<p>For non-competitive inhibitors:</p>	1.5	CO4

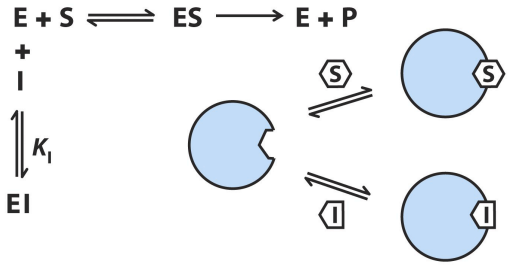
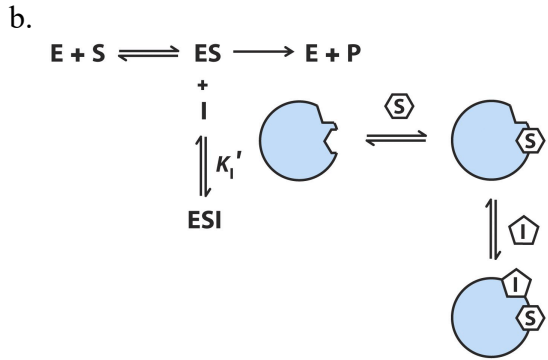
	a. V_{max} decreases b. V_{max} remains unchanged c. K_m decreases d. K_m increases		
Q15	Butylated hydroxyanisole is used in foods as _____	1.5	CO5
Q16	Sequential reduction of molecular oxygen (equivalent to sequential addition of electrons) leads to formation of reactive oxygen species like _____	1.5	CO5
Q17	The defective enzyme associated with the glycogen storage disease, "Pompe" is _____	1.5	CO4
Q18	Diffusion of non-polar molecules across membranes in the direction of higher to lower concentrations is known as _____	1.5	CO3
Q19	Waxes are _____ that are made by combining fatty acids with long chain alcohols.	1.5	CO3
Q20	The base catalyzed hydrolysis of esters is also called _____	1.5	CO3

SECTION B (Scan and upload)

Q21	Describe the biochemical functions of calcium in human body. (5 marks)	5	CO4
Q22	<p>What are steroids? State its classifications. (2 marks)</p> <p>Which of the following fatty acids has highest melting point? Explain. (3 marks)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Stearic acid</p> </div> <div style="text-align: center;">  <p>Linolenic acid</p> </div> </div>	5	CO3
Q23	What are the factors that impact concentrations of hormones in target cells? (2 marks) Compare general features of hormones that bind to intracellular receptors and cell surface receptors. (3 marks)	5	CO5
Q24	Describe the various mechanisms of protection against free radical damage? (5 marks)	5	CO5

SECTION C (Scan and upload)

Q25	<p>What is Basal metabolic rate? (2.5 marks)</p> <p>What factors impact basal metabolic rate? (2.5 marks)</p> <p>Calculate the ΔG° for the following reaction: (5 marks)</p> <p>Glucose + ATP \rightarrow ADP + glucose-6-phosphate</p>	15	CO1
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	<p>Given are: Synthesis of glucose 6-phosphate 1. Glucose + P_i → glucose-6-phosphate + H₂O; ΔG° = 13.8 kJ/mol 2. ATP + H₂O → ADP + P_i; ΔG° = - 30.5 kJ/mol</p> <p>Describe the major pathways for energy metabolism. (5 marks)</p>		
<p>Q26</p>	<p>Hydrolysis of p-nitrophenylacetate to p-nitrophenol is catalysed by α-chymotrypsin enzyme. The proposed mechanism is:</p> $E + S \xrightleftharpoons{\text{Fast}} ES \xrightarrow{K_1} ES' + P_1 \xrightarrow{K_2} E + P_2$ <p>Where, ES, P₁ and P₂ are acetal enzymes, nitrophenol and acetate ion, respectively. If K₁ is much smaller than K₂, draw a qualitative plot of potential energy vs reaction coordinate for above reaction. (5 marks)</p> <p>Using the following diagram, identify the modes of enzyme inhibition. E, Enzyme; S, Substrate; I, Inhibitor. (4 marks)</p> <p>a.</p>  <p>b.</p>  <p>Using Michaelis-Menton plot, graphically represent impact of (a) Competitive; (b). Non-competitive enzyme inhibition on Michaelis constant (K_m) and maximum rate achieved (V_{max}). (6 marks)</p>	<p>15</p>	<p>CO4</p>
SECTION D (Scan and upload)			
<p>Q27</p>	<p>What is electron transport chain? (3 marks) Describe the role of citric acid cycle in transamination and gluconeogenesis. (4 marks) Define caramelization. (3 marks)</p>	<p>10</p>	<p>CO2</p>
<p>Q28</p>	<p>Describe the principle forces associated with protein folding. (4 marks) Briefly describe the secondary, tertiary and quarternary structure of proteins. (6 marks)</p>	<p>10</p>	<p>CO3</p>