

<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Theory Examination, May 2022**

**Course: Biochemistry**

**Program: B.Pharm**

**Course Code: BP203T**

**Instructions: Read the Question Paper Carefully.**

**Semester: II**

**Time 03 hrs.**

**Max. Marks: 75**

**SECTION A**

S. No.	CO	Multiple Choice Questions (20X1) or Objective type Questions (10X2)	Marks
			<b>20</b>
1	CO1	The Gibbs free energy change will be negative when the process is  A) Spontaneous B) Non spontaneous C) Equilibrium D) Exothermic	1
2	CO1	If the the values of enthalpy change and entropy change is positive, which of the following will be true?  A) Process will be spontaneous at any given temperature B) Process will be spontaneous at high temperature only C) Process will never be spontaneous D) Process will be spontaneous at low temperature only	1
3	CO1	What is the name of the molecule which donates its electrons?  A) Reducing agent B) Oxidative agent C) Standard reduction potential D) Oxidant	1
4	CO1	Which of the following is a chemical link between catabolism and anabolism?  A) AMP B) ADP C) ATP D) GDP	1
5	CO2	What is the general term used for the anaerobic degradation of glucose to obtain energy?  A) Anabolism B) Oxidation C) Fermentation D) Metabolism	1

6	CO2	<p>Glycolysis converts</p> <p>A) Glucose into pyruvate  B) Glucose into phosphoenolpyruvate  C) Fructose into pyruvate  D) Fructose into phosphoenolpyruvate</p>	1
7	CO2	<p>Oxidative phosphorylation results in the formation of</p> <p>A) Oxygen  B) ADP  C) ATP + H<sub>2</sub>O  D) NADH</p>	1
8	CO2	<p>Where glycogenesis takes place in cells?</p> <p>A) Cytosol  B) Mitochondria  C) Ribosomes  D) Endoplasmic reticulum</p>	1
9	CO3	<p>Which one of the following statements concerning fatty acid molecules is CORRECT?</p> <p>A) They consist of a carboxylic acid head group attached to a carbohydrate chain.  B) They are called polyunsaturated when they contain one or more carbon-carbon double bonds.  C) Their melting points increase with increasing unsaturation.  D) They almost always have their double bonds in the cis configuration when they occur naturally.</p>	1
10	CO3	<p>The subcellular site of the breakdown of long chain fatty acids to acetyl-CoA via <math>\beta</math>-oxidation is:</p> <p>A) The cytosol  B) The matrix of the mitochondria  C) The endoplasmic reticulum  D) The mitochondrial intermembrane spaces</p>	1
11	CO3	<p>Identify the amino acid that is the major contributor to the transport of nitrogen destined for excretion as urea:</p> <p>A) Alanine  B) Glutamine  C) Glycine  D) Lysine</p>	1

12	CO3	<p>Amino acids with aromatic side chain are</p> <p>A) Tryptophan, asparagine, tyrosine  B) Tryptophan, threonine, tyrosine  C) Phenylalanine, tryptophan, serine  D) Phenylalanine, tryptophan, tyrosine</p>	1
13	CO4	<p>Choose one of the following that contain DNA components.</p> <p>A) A phosphate group, adenine, and ribose  B) A phosphate group, guanine, and deoxyribose  C) Cytosine and ribose  D) Thymine and deoxyribose</p>	1
14	CO4	<p>What is the catabolic end product of purine nucleotide?</p> <p>A) Uric acid  B) NH<sub>3</sub>  C) CO<sub>2</sub>  D) Both B and C</p>	1
15	CO4	<p>Purines and Pyrimidines are the nitrogen bases present on the nucleotides. Which of the following is a purine base?</p> <p>A) Adenosine  B) Cytosine  C) Thymine  D) Uracil</p>	1
16	CO4	<p>Which enzyme catalyzes the deamination of adenosine to inosine?</p> <p>A) Adenosine synthase  B) Adenosine deaminase  C) Inosine synthase  D) Inosine synthetase</p>	1
17	CO5	<p>Which of the following is false for lactate dehydrogenase (LDH)?</p> <p>A) It is a tetrameric enzyme  B) It catalyzes reversible phosphorylation of creatinine to creatinine phosphate by ATP  C) It has five isoenzymes  D) It is made up of two polypeptides</p>	1
18	CO5	<p>Enzymatic activity can be activated or inhibited through non-covalent interaction of the enzyme with metabolites other than the substrate. This form of control of enzyme activity is termed as:</p> <p>A) Allosteric regulation  B) Covalent regulation  C) Proteolysis  D) Compartmentalization</p>	

19	CO5	The rate determining step of Michaelis-Menten kinetics is: A) The complex dissociation step to produce products B) The product formation step C) The complex formation step D) None of the above	1
20	CO5	Non-competitive inhibitors: A) Lower $V_{max}$ B) Unchanged $V_{max}$ C) $K_m$ decreases D) $K_m$ increases	1

**SECTION B**

**Long Answers (Answer two out of 3) 2X10**

			<b>20</b>
1	CO5	a) Describe Michaelis-Menten mechanism of enzyme catalysis. (2 marks) b) Define (i) competitive inhibition; (ii) uncompetitive inhibition and (iii) non-competitive inhibition. (6 marks) c) What is the significance of Michaelis-Menten constant? (2 marks)	(2+6 +2)
2	CO2	a) Describe the energetics of TCA cycle. (5 marks) b) Why is pentose phosphate pathway important? (5 marks)	(5+5)
3	CO3	a) How are fatty acid synthesis regulated allosterically and by covalent modification? (4 marks) b) Write the steps associated with cholesterol synthesis. (4 marks) c) Define transamination and deamination of amino acids. (2 marks)	(4+4 +2)

**SECTION C****Short Answers (Answer 7 out of 9) 7X5**

			<b>35</b>
1	CO1	Oxaloacetate + Acetyl-CoA + H <sub>2</sub> O → citrate + CoA + H <sup>+</sup> At pH 7 and 25°C in rat heart mitochondria – [oxaloacetate] = 1 μM; [acetyl-CoA] = 1 μM; [citrate] = 220 μM; [CoA] = 65 μM; ΔG° = -32.2 kJ/mol ; RT = 2.48 kJ/mol. What is direction of metabolite flow?	5
2	CO1	Explain the major pathways for energy metabolism.	5
3	CO2	Describe the components of electron transport chain.	5
4	CO2	How do hormones regulate the blood glucose level?	5
5	CO3	How are ketone bodies significant to living system? What is ketosis?	3+2
6	CO3	Describe the catabolism of heme.	5
7	CO4	Define GOUT disease. Write about the treatment available for GOUT disease.	2.5+2.5
8	CO5	Write the differences between enzymes and catalyst. How are enzymes classified as per IUB nomenclature?	2.5+2.5
9	CO5	Describe the use of enzymes as diagnostics.	5
<b>Total</b>			<b>75</b>