Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2022

Course: Nutrition Biochemistry **Semester : 3rd**

Program: B.Tech. Food Tech **Duration : 3 Hours**

Course Code: HSFT 2003 **Max. Marks: 100**

Instructions: All questions are compulsory

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q1	Which of the following categories of nutrients does water belong? A. Macronutrient B. Micronutrient C. Nanonutrient D. None of the above	**1.5**	**CO1**
Q2	Which amongst the following food items have the highest specific dynamic action: A. Potato B. Mango C. Corn D. Egg	**1.5**	**CO1**
Q3	Which of the following statements about BMR is incorrect? A. BMR is directly related to surface area. B. Males have higher BMR than age matched females C. BMR is increased in warm climate D. BMR is inversely proportional to the age	**1.5**	**CO1**
Q4	Which of the following statements about the fed and fasting metabolic states is correct? A. In the fasting state, muscle synthesizes glucose from amino acid. B. In the fed state, adipose tissue can take up glucose for synthesis of triacylglycerol because glucose transport in adipose tissue is stimulated in response to glucagon.	**1.5**	**CO1**

	C. Ketone bodies provide an alternative fuel for RBCs in fasting state. D. Plasma glucose is maintained in starvation and prolonged fasting by gluconeogenesis from fatty acids.		
Q5	Electrons are extracted by electron transport chain from TCA cycle by A.Oxidation of ATP and GTP B. Oxidation of NAD^+ and FAD C. Reduction of ATP and GTP D. Reduction of NAD^+ and FAD	**1.5**	**CO2**
Q6	What is the general term used for the anaerobic degradation of glucose to obtain energy? A. Anabolism B. Oxidation C. Fermentation D. Metabolism	**1.5**	**CO2**
Q7	Which of the following statement is true? A. Glucose is formed from pyruvate during glycolysis B. Glycolysis is the exact reverse of gluconeogenesis C. Glycolysis occurs in the mitochondria D. Glycolysis can occur under anaerobic conditions	**1.5**	**CO2**
Q8	Glycolysis is also called: A. Kreb's cycle B. Respiratory cycle C. Embden Meyerhof pathway D. HMP-shunt	**1.5**	**CO2**
Q9	Amino acid that is know as alpha-helical inducer in proteins: A. Glycine B. Alanine C. Leucine D. Proline	**1.5**	**CO3**
Q10	Select the one of the following statements that is NOT CORRECT. A. The side-chains of the amino acids cysteine and methionine absorb light at 280 nm. B. Glycine is often present in regions where a polypeptide forms a sharp bend, reversing the direction of a polypeptide. C. Polypeptides are named as derivatives of the C-terminal aminoacyl residue. D. The C, N, O, and H atoms of a peptide bond are coplanar.	**1.5**	**CO3**

Q11	Which of the following are positively charged basic amino acids? A. Lysine and arginine B. Lysine and asparagine C. Glutamine and arginine D. Lysine and glutamine	**1.5**	**CO3**
Q12	Identify the amino acid that is the major contributor to the transport of nitrogen destined for excretion as urea: A. Alanine B. Glutamine C. Glycine D. Lysine	**1.5**	**CO3**
Q13	Which one of the following statements concerning fatty acid molecules is CORRECT? 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.	**1.5**	**CO4**
Q14	After they are produced from acetyl-CoA in the liver, ketone bodies are mainly used for which one of the following processes? A. Excretion as waste products B. Energy generation in the liver C. Conversion to fatty acids for storage of energy D. Generation of energy in the tissues	**1.5**	**CO4**
Q15	The breakdown of one molecule of a C16 fully saturated fatty acid (palmitic acid) by β-oxidation lead to the formation of: A. 7 FADH2, 7 NADH and 8 acetyl CoA molecules B. 7 FADH2, 7 NADH and 7 acetyl CoA molecules C. 8 FADH2, 8 NADH and 7 acetyl CoA molecules D. 7 FADH2, 8 NADH and 8 acetyl CoA molecules	**1.5**	**CO4**
Q16	Which of the following statements about fatty acids is true? A. Fatty acids with longer chain lengths have a higher melting point than fatty acids with shorter chain lengths.	**1.5**	**CO4**

	B. Saturated fatty acids have a lower melting point than unsaturated fatty acids. C. Cis double bonds of unsaturated fatty acids cause tighter packing of hydrophobic tails. D. Double bonds in polyunsaturated fatty acids are almost always conjugated.		
Q17	Multiple forms of the same enzyme is referred to as _____ A. Allosteric enzyme B. Biosensor C. Isoenzyme D. Effectors	**1.5**	**CO5**
Q18	Enzymes catalyzing the linking together of two compounds utilizing the energy made available due to simultaneous breaking of a pyrophosphate bond in ATP or a similar compound are known as: A. Isomerases B. Transferases C. Ligases D. Hydrolases	**1.5**	**CO5**
Q19	Which of these are true: A. All proteins are enzymes B. All catalysts are enzymes C. Enzymes alter chemical equilibrium to increase rate of a reaction D. Linear form of Michaelis-Menten equation is Lineweaver Burk Plot	**1.5**	**CO5**
Q20	Optimum pH for trypsin to exhibit maximum function: A. ≤ 5 B. 7-8 C. 2 D. ≥ 9	**1.5**	**CO5**
	Section B **(4Qx5M=20 Marks)**		
Q1	**A.** What is specific dynamic action? (2.5 marks) **B.** Write the significance of specific dynamic action. (2.5 marks)	**5**	**CO1**
Q2	**A.** Why are blockages in blood vessels bad for the heart?. (3 marks) **B.** Write the significance of lactate production. (2 marks)	**5**	**CO2**

Q3	**A.** Write the characteristics of vitamin (2 marks) **B.** How are vitamins useful to human body? (3 marks)	**5**	**CO4**
Q4	Justify with examples the specificity of enzymes.	**5**	**CO5**
Section C **(2Qx15M=30 Marks)**			
Q1	**A.** Describe the amphibolic nature of TCA cycle. (5 marks) **B.** What are anomers? (2 marks) **C.** Briefly write about caramelization reaction. (4 marks) **D.** Describe electron transport chain. (4 marks)	**15**	**CO2**
Q2	**A.** Write the significance of ketone bodies. (3 marks) **B.** Define ketosis. (3 marks) **C.** Derive Michaelis Menton equation. (9 marks)	**15**	**CO5**
Section D **(2Qx10M=20 Marks)**			
Q1	**A.** Calculate the $\Delta G°$ for the following reaction: (5 marks) Glucose + ATP → ADP + glucose-6-phosphate Given are: Synthesis of glucose 6-phosphate 1. Glucose + P_i→glucose-6-phosphate + H_2O; $\Delta G° = 13.8$ kJ/mol 2. ATP + H_2O → ADP + P_i ; $\Delta G° = -30.5$ kJ/mol **B.** Describe the factors that affect basal metabolic rate. (5 marks)	**10**	**CO1**
Q2	**A.** What is albinism? (2 marks) **B.** Explain the metabolic roles of phenylalanine and tyrosine. (3 marks) **C.** Describe the principal forces that govern protein folding. (5 marks)	**10**	**CO3**