



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.Sc. DEGREE EXAMINATION – FOOD CHEMISTRY AND FOOD PROCESSING**

**SECOND SEMESTER – APRIL 2015**

**FP 2807 - FOOD BIOCHEMISTRY**

Date : 18/04/2015

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

**Part A**

**Answer ALL the questions.**

**10 x 2=20 marks**

1. The standard reduction potential,  $E$  of any redox pair is defined for the half-cell reaction:  
Oxidizing agent +  $n$  electrons  $\rightarrow$  reducing agent  
The  $E$  values for the  $\text{NAD}^+/\text{NADH}$  and pyruvate/lactate conjugate redox pairs are  $-0.32$  V and  $-0.19$  V, respectively. Which conjugate pair has the greater tendency to lose electrons?
2. What are inhibitors and uncouplers of ETC?
3. Consequence of starvation is a reduction in muscle mass. What happens to the muscle proteins?
4. Define oxidative phosphorylation.
5. Mention the role of Ammonium persulphate and SDS in protein denaturation studies.
6. Normal human blood plasma contains all the amino acids required for the synthesis of body proteins, but not in equal concentrations. Alanine and glutamine are present in much higher concentrations than any other amino acids. Suggest why.
7. What is the role of Hemoglobin as buffers in maintaining blood pH?
8. Give the structure of cholesterol numbering its carbon atoms.
9. Give the bioenergetics of the metabolism of Caproic acid.
10. "Lipids are a concentrated source of energy". Justify with two reasons.

**Part B**

**Answer ANY EIGHT questions.**

**8 x 5 =40 marks**

11. Weight-reducing diet heavily promoted some years ago required the daily intake of "liquid protein" (soup of hydrolyzed gelatin), water and an assortment of vitamins. All other food and drink were to be avoided. People on this diet typically lost 10 to 14 lb in the first week.
  - (a) Opponents argued that the weight loss was almost entirely due to water loss and would be regained very soon after a normal diet was resumed. What is the biochemical basis for this argument?
  - (b) A number of people on this diet died. What are some of the dangers inherent in the diet and how can they lead to death?

12. Ouabain specifically inhibits the Na<sup>+</sup>K<sup>+</sup> ATPase activity of animal tissues but is not known to inhibit any other enzyme. When ouabain is added to thin slices of living kidney tissue, it inhibits oxygen consumption by 66%. Why? What does this observation tell us about the use of respiratory energy by kidney tissue?
13. Explain the supramolecular architecture of biological membranes and its functions.
14. Describe the mechanism of prokaryotic translation process.
15. Explain the role of bicarbonate buffers in regulating blood pH. Derive the relationship of pH and pK<sub>a</sub> through Henderson Hassalbach equation. The values of pK<sub>a</sub> is 6.4, partial pressure of bicarbonate ions is 24 and carbonic acid is 1.3.
16. Sun is the principle source of energy for living organisms. some living organisms like plants acquire energy directly from the sunlight while other organisms like humans acquire energy from the sun indirectly. Enumerate this energy transduction pathway that strongly supports laws of thermodynamics, by relating the following concepts
  - a) Exothermic reaction
  - b) Endothermic reaction
  - c) photophosphorylation/Calvin cycle/dark reaction.
  - d) Oxidative phosphorylation/light reaction.
17. Explain gluconeogenesis.
18. Discuss urea cycle with its regulation.
19. Explain the role of aldosterone and renin-angiotensin system in sodium balance.
20. Enumerate the metabolic pathway of an odd number carbon chain fatty acid.
21. Write a short note on the functions of phospholipids and glycolipids in our system.
22. Explain briefly the functions of any two steroid hormones with their structures.

### Part C

**Answer ANY FOUR questions. Each carries TEN marks**

**4 x 10 = 40 marks**

23. Explain TCA cycle and its regulation.
24. Discuss the following
  - i) Transamination in amino acid metabolism
  - ii) Complex IV in electron transport chain
  - iii) Elongation process in DNA replication
25. Discuss Urea cycle with its regulation.
26. Explain the possible inborn errors of carbohydrate metabolism.
27. What is a lipoprotein? Classify the types of lipoproteins with their functions. Explain the role of VLDL in blood circulation.
28. Enumerate with a flow chart the biosynthetic pathway of fatty acids highlighting the enzymes and cofactors involved in the synthesis.

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