

2020

BIOCHEMISTRY — HONOURS

Fifth Paper

(Module - IX)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any two** more questions, taking **one** from each **Unit**.

1. Answer the following questions : 2×5
- (a) Amino acid metabolism is linked to TCA cycle. — Give two examples for catabolic pathway and two for anabolic pathway.
 - (b) Which carbon atom of the products of aldolase reaction would be radioactive if glucose labelled with ^{14}C at C_1 is metabolized by glycolytic pathway?
 - (c) Name one inhibitor of electron transport chain complex I and one of complex II.
 - (d) Differentiate between alkaptonuria and phenylketonuria.
 - (e) Show two examples (reactions) where coenzyme A is used.

Unit - I

2. (a) What are the rate limiting steps in glycolysis? Which one is the most regulated step? Explain briefly how this step is regulated allosterically.
- (b) Aconitase catalyses the TCA cycle reaction : citrate \rightleftharpoons isocitrate
Why must citrate be converted to isocitrate before oxidation takes place?
Name one inhibitor of this enzyme and show its mode of action.
Describe the effect of increasing concentration of Ca^{+2} on the rate of TCA cycle.
- (c) Describe the pathway by which galactose is converted into a glycolytic intermediate. Is it possible to obtain net synthesis of glucose from pyruvate if TCA cycle and oxidative phosphorylation are totally blocked? Justify. (2+2+2)+(2+2+3)+(5+2)
3. (a) Show that glucokinase, not hexokinase helps the liver in 'buffering' the blood glucose concentration.
- (b) Name one disease related to glycogen metabolism and give its cause.
- (c) How 2, 4-dinitrophenol acts as uncoupler of oxidative phosphorylation? Briefly explain.
- (d) Gluconeogenesis is regulated at the level of PEPCK enzyme. — Explain.

Please Turn Over

- (e) Describe chemiosmotic hypothesis giving experimental evidences to show that only PMF links ETC and ATP synthesis.
- (f) What are ketone bodies? Give two examples. Why their concentrations go up in diabetes?
4+2+2+3+3+(2+2+2)

Unit - II

- 4. (a) In what way does a diet lacking in pantothenic acid affect the biosynthesis of fatty acids?
 - (b) Describe the importance of reaction which is catalyzed by HMG CoA reductase. Show the reaction and one of its inhibitors.
 - (c) What is the general 1-Carbon group carrier in biochemical metabolism? Show a reaction that utilises it.
 - (d) Write down the first step of heme biosynthesis mentioning its enzyme and coenzyme/cofactor, if any.
 - (e) Name three important metabolites produced from tyrosine. Give the necessary reactions.
 - (f) Mention one disorder related to adenosine catabolism pathway and give its cause. 4+3+3+4+3+3
- 5. (a) What are the major differences between fatty acid synthesis and its breakdown?
 - (b) Explain briefly the regulation of fatty acid synthesis showing the steps that are regulated.
 - (c) What is bilirubin? What is its precursor? Where is it synthesized?
 - (d) Write down the cause(s) of gout mentioning crucial metabolic reactions. How can it be treated?
 - (e) What is oxidative deamination? What is its significance?
 - (f) Describe the reaction catalyzed by ATCase. What is its importance? 4+3+(1+1+1)+4+(2+2)+2
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