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Department of Biochemistry
First Semester B.Sc (Hons) Biochemistry Degree Examination 2017/2018 Session

BCH 405: Metabolic Regulation
February, 2018

Time allowed : 2½ hrs.

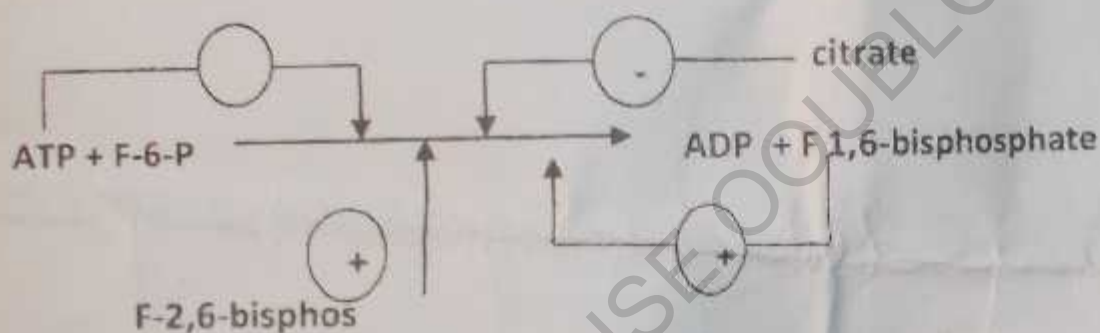
Instructions: Answer ONE any other TWO questions

- (1) (a) List six general strategies/ mechanisms by which metabolic flux/ processes are controlled in biological system
(b) Distinguish between the following pairs of terms:
(i) feedback inhibition and feedback regulation (ii) constitutive enzyme and inducible enzyme
(iii) proprotein and zymogen (iv) second messenger and "first" messenger
(v) homotropic modulator and heterotropic modulator

(c) Covalent modification is a common means by which metabolic processes are regulated in biological entities. Aside from phosphorylation/ dephosphorylation (i) mention any other three types of covalent modification of target proteins that you are familiar with (ii) Give five (5) properties that you would expect allosteric enzymes to possess

(d) What are isoenzymes? Give the different isoenzyme forms of mammalian Lactate dehydrogenase (LDH)

(e) The scheme below is showing the reaction catalysed by phosphofructose kinase I (PFK-1) in glycolysis



Using the following terms (negative homotropic effector, negative heterotropic effector, positive heterotropic effector, negative feedforward control, positive feedback control)

- (i) select which terms appropriately describes the role of citrate, ATP, ADP on the enzyme, PFK 1
2. Name any **two** signal transduction pathway/ system involved in metabolism and using diagram only, if you wish, show how glucagon regulate glycogen breakdown/metabolism in the liver
3. (a) Hydroxyl-methyl glutarate CoA (HMG- CoA) reductase is a model allosteric enzyme that catalyzes the rate-limiting step in *de novo* cholesterol biosynthesis. What are the structural features of this enzyme? Discuss briefly how its activity is regulated.
4. (a) Describe the typical structural changes that brings about the conversion of a **named** proenzyme (proprotein) to its active form
(b) In eukaryotes, anabolic and catabolic pathways that interconvert common products often takes place in specific subcellular compartments. Illustrate this concept using a suitable example
5. (a) Using a graphical illustration, give the MWC and the Koshland's proposed models to explain the mechanism of cooperative ligand binding by allosteric enzymes. What are the major tenets of each of these models