Department of Biochemical Engineering and Biotechnology

BEL 110: Molecular Cell Biology

Major Test (2007-2008)

Time: 2 hrs
Max. Marks: 40

Q.1(a)	What is the biological significance of phosphorylation of sugars immediately after entering the cell?	[2]
(b)	The hydrophobic interactions of the aliphatic side chains of amino acids help to stabilize the folded structure of proteins. What purpose is served by the variety of sizes and shapes of aliphatic side chains?	[2]
(c)	In resting muscle, the concentration of K^+ outside the cell is 2.5 mM and that inside is 12.5 mM. Calculate the membrane potential that would exist in the resting muscle if membrane were permeable only to K^+. [R=1.99 Cal/mol. K, T= 25^0C and F= 23.062 Kcal/V/mol.	[2]
(d)	ATP and NADH release a large amount of free energy upon transfer of phosphate group to water and electrons to oxygen respectively. However, both molecules are stable in the presence of water or oxygen. Explain why ?	[2]
(e)	ATP falls in the middle of the list of compounds having high phosphate group transfer potential. Explain why this is advantageous for energy coupling during metabolism?	[2]
Q2.(a)	Suppose you do SDS polyacrylamide gel electrophoresis under a condition where you have not added mercaptoethanol. What difference you expect under this condition? What information will you get from the results of gel electrophoresis when you have added mercaptoethanol?	[2]
(b)	Suppose you have a mixture of two proteins known to differ in their molecular weight, which method of protein purification will you use to separate them? Discuss the principle of the same method.	[2+2]
(c)	Suppose you have been given a blood sample containing antigen of a particular virus, which Immunoassay will you perform to detect this antigen directly? Explain the principle of method employed	[2+2]
Q3.(a)	What do you understand by hybridoma? What is the basis of selection of hybridroma cell line?	[2+2]
(b)	Explain the role of fluorescence microscopy in understanding mechanism of hormone action	[2]
(c)	How does the genomic library differ from cDNA library? How these libraries are used for gene cloning? What would be advantage of inserting genes coding for resistance to antibiotics into a vector?	[2+2+2]
Q4.(a)	Suppose you have isolated and purified few milligrams of protein after several steps of purification and want to get the same purified protein in lager quantity. What purification method will you use for single step purification of the same protein. Give reason.	[2]
(b)	A person is interested in a novel enzymatic activity to cleave poisonous gas? What strategy will he require to get such a novel enzyme	[2]
(c)	Suppose you have a restriction enzyme which is unable to produce sticky end. What will you do if you have to clone the gene using same enzyme?	[2]
(d)	If a person is using polyclonal antibody instead of monoclonal antibody, what difference he will observe in his results	[2]