UNIVERSITY COLLEGE LONDON

EXAMINATION FOR INTERNAL STUDENTS

MODULE CODE : **BIOC0006**

ASSESSMENT Pattern: **BIOC0006A5UE**

MODULE NAME : **Essential Protein Structure and Function**

LEVEL: : **Undergraduate**

DATE: : **03-May-2023**
TIME : **14:30**
DURATION : **02:00**

Late submission is permitted for Controlled Conditioned exams but late penalties will apply - any submissions that are up to 40 minutes late will be penalised, after which no submissions will be accepted under any circumstances.
You must ensure to allow sufficient time to upload and hand in your work

This paper is suitable for candidates who attended classes for this module in the following academic year(s):

Year
2022-23

Duration	<< Exam Duration>>
Additional time for converting handwritten notes to PDF where applicable	**none**
Upload window	**20**
Total time	**2 Hours 20 mins**

Additional material	
Special instructions	

TURN OVER

BIOC0006: ESSENTIAL PROTEIN STRUCTURE AND FUNCTION

Construction of answers:
You have a period of two hours to complete this exam. You have an additional 20 minutes to upload your answers to AssessmentUCL.

The word limit for each question is 600 words. Any words over this limit will not be marked. Please include a word count at the end of each answer.
Use of references and referencing: You may refer to lecture material, books, reviews, papers, etc. whilst writing your answers and you should include brief citations in the text indicating the source of any extra reading e.g. 'Protein 1 binds to protein 2 when it is phosphorylated (Jones et al. 2008)'. You do not need to include a list of references at the end of your answer.
You must write your answers in your own words.
You are encouraged to use annotated diagrams to explain your answers when necessary. You can hand draw figures and insert an image file, or use a simple drawing application. DO NOT paste figures or images from other sources.
Words included in a diagram itself, such as labels, will not count towards the word count. Figure legends are not required; if included, words in a legend will be counted towards the word count.

Marking:
Answers will be awarded percentage marks based on the 'UCL FLS Exam Essay Marking Guidelines'.

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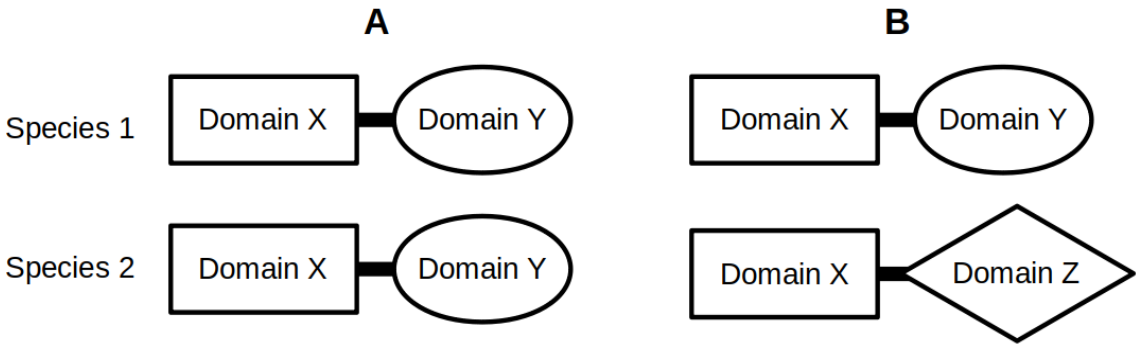
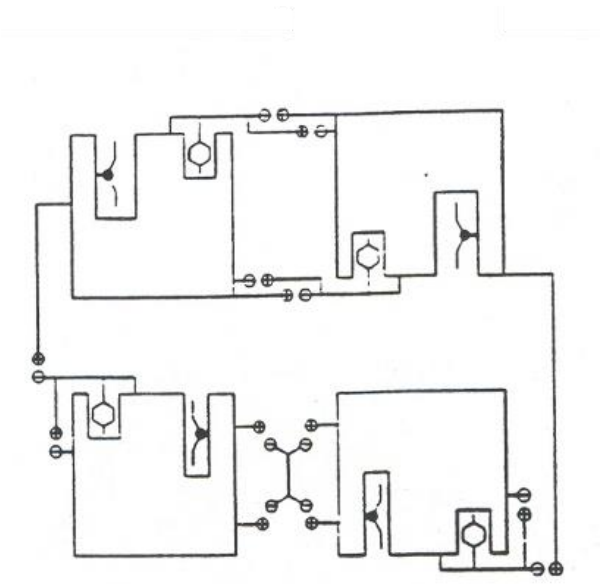
Candidates must answer any THREE questions.

1. Explain the basic concepts of protein sequence alignment including at least two ways of scoring the similarity of amino acids in the alignment. Given the following diagram, where proteins from two species (each containing two domains) are being aligned, explain for alignment A and alignment B whether global or local sequence alignment would be more appropriate and why.



2. Explain why haemoglobin is formed as a tetrameric protein in order to function effectively as an oxygen carrier in blood. Using the schematic diagram of a haemoglobin tetramer shown below, identify the haemoglobin state which is being shown and the molecular interactions that stabilise this. Sketch an equivalent fully labelled diagram that shows the other state of haemoglobin and describe the changes that take place between the two states.



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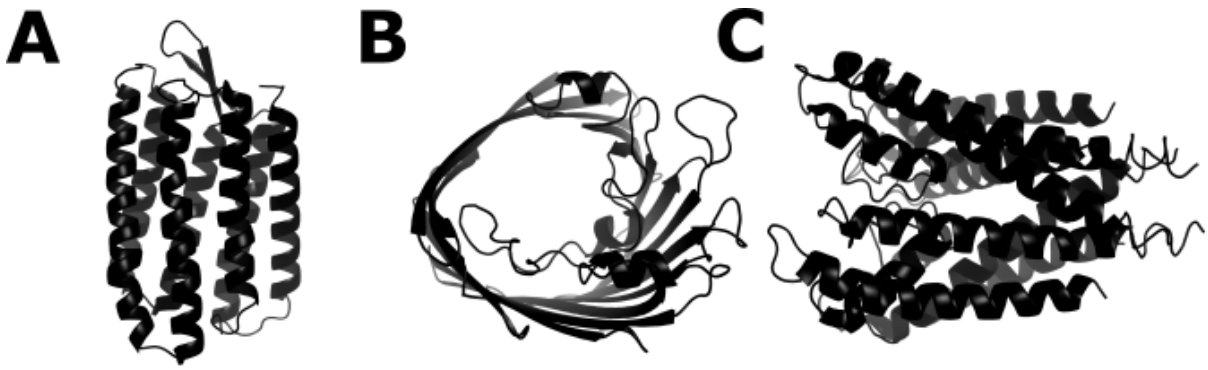
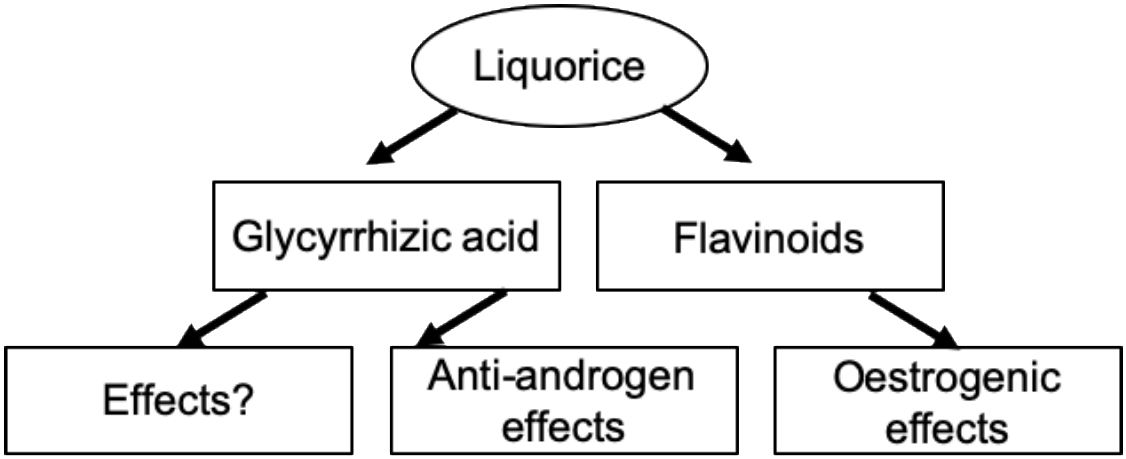
3. For each membrane protein in the following ribbon diagrams, identify each one, explain what can be transported by the protein and why, and describe the molecular mechanism involved.



4. With reference to the figure shown, discuss the effects mediated by glycyrrhizic acid and how they affect enzymic actions. Note that the effects in the bottom left box are not named in this figure, but also require discussion in your answer.



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5. You have been asked to design an antibody that can bind specifically to mutant Z alpha-1-antitrypsin (AAT) and stop its polymerisation while it is being synthesised in the cell. Explain which species on the AAT folding pathway you would target with the antibody and why. In your answer also outline an experiment that you would use to prove that the designed antibody binds to the AAT protein.

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END OF PAPER