*BANGOR UNIVERSITY*

ENTRANCE SCHOLARSHIP EXAMINATION

**2024**

**BIOLOGY**

# Time allowed: 2 hours

# Answer TWO questions (write each answer in a SEPARATE answer book).

1. Using specific examples, discuss the enzymatic control of chemical reactions in cells, with reference to the “lock and key hypothesis” and the formation of enzyme-substrate complexes.
2. Explain how the link between cigarette smoking and lung cancer was first established, and how smoking leads to the development of lung cancer and emphysema. Also consider what the effects of “vaping” might have on gas exchange in the lungs, and whether sufficient research has been conducted into vapes.
3. Cardiovascular disease and cancer are now the major causes of death in developed countries. These rates of death are much lower in less developed countries. Discuss the possible reasons for this difference and the current treatments for cardiovascular disease including statins, angioplasty and lifestyle changes.
4. With specific reference to the structure of the human genome, discuss the discovery of DNA fingerprinting by Professor Alec Jeffreys at the University of Leicester – the science behing the discovery, and how it is currently being used in forensic science and in paternity profiling.
5. Stem cells are currently in the news as they are being used (after genetic modification) to treat a number of conditions. Discuss the nature of stem cells and why certain animals are able to regenerate tissues and limbs while humans in general cannot. But the human liver has excellent regenerative potential but other human organs and tissues do not. Discuss the possible reasons for this.
6. Mutations are happening in the human genome all the time, but only a very few of these mutations lead to genetic diseases such as cancer or cystic fibrosis. Why is this? Using cystic fibrosis as an example, discuss the cause of this disease and how it could be treated using molecular techniques. Would it be be possible to eliminate genetic disease from the human population?
7. Type 2 diabetes is now common in the populations of developed countries but is generally unknown in developing countries. Discuss both Type 1 and Type 2 diabetes, their causes and effects, and discuss how both types of disease could be treated. If lifestyle changes are recommended for Type 2 diabetics, and the patient refuses to change his her lifestyle, should pharmaceutical treatments be withdrawn?
8. The “microbiome” is currently a topic of increasing scientific interest and research. What is the human microbiome and why is it so important to our health? Can the composition of the human microbiome be changed so as to make it more beneficial to us?

**END.**