THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ZOOLOGY
BSc DEGREE PROGRAMME
FINAL EXAMINATION 2023/2024
COURSE TITLE: HUMAN BIOLOGY
COURSE CODE: ZYU5305/ZYE5305
DURATION: TWO HOURS

DATE: 10 April 2024 TIME: 9.30 a.m. – 11.30 a.m.

ANSWER ANY FOUR (4) QUESTIONS.
ILLUSTRATE ANSWERS WITH LABELLED DIAGRAMS WHERE NECESSARY.

1. Write on the following.
   - **i)** Human pectoral girdle. [50 marks]
   - **ii)** Adaptions of the human foot for bipedal locomotion. [50 marks]

2. In humans, normal breathing is a rhythmical and involuntary process. However, certain factors can influence the rate and depth of breathing to meet the metabolic demands of the body. To justify this statement, explain the following:
   - **i)** Control of basic rate and depth of breathing. [08 marks]
   - **ii)** Neural factors that influence the breathing rate and depth. [44 marks]
   - **iii)** Chemical factors that influence the breathing rate and depth. [48 marks]

3. Explain how the body would adjust through physiological mechanisms in the following situations.
   - **i)** A British researcher living in an extreme dry heat environment while on a three-month field visit to the Sahara Desert. [50 marks]
   - **ii)** A Sri Lankan student on a one month expedition to the North Pole exposed to a very cold environment. [50 marks]

4. Differentiate between the following types of immune responses.

   i) Immune response that develops when a child is first vaccinated against chickenpox, with the immune response that develops if this child is later naturally exposed to the chickenpox virus. [50 marks]

   ii) Immunity developed when a person is given the polio vaccine, with the immunity developed when a person is given an injection of tetanus antibodies. [50 marks]

5. Sara and John visit you at 12 weeks pregnancy for genetic counselling. Sara's brother has sickle cell anaemia (SCA) disease, but Sara and her parents do not have the disease. Sara and John are concerned that their baby may inherit SCA disease.

   i) What is the probability of Sara being a carrier with respect to the gene causing SCA? Clearly explain the basis of your answer. [20 marks]

   ii) When the couple was screened for a mutation in the gene causing SCA, Sara was found to be a carrier and John was unaffected (normal). [30 marks]

      a) Draw a labelled diagram to illustrate how their baby may or may not inherit SCA (use 'H' and 'h' for the dominant and recessive alleles, respectively).

      b) What advice will you give the couple on the possible risk of their baby developing SCA?

   iii) Outline the two genetic tests available to detect a genetic abnormality during the prenatal stage. [45 marks]

   iv) If this couple wishes to do a prenatal test to screen the foetus for SCA, which one of the genetic tests would you recommend and why? [05 marks]

6. Write notes on two (02) of the following:

   a) Taste buds and the sense of taste. [50 marks]

   b) Carcinogens. [50 marks]

   c) Oral contraceptives. [50 marks]

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