ST MARY’S UNIVERSITY

TWICKENHAM, LONDON

BSc Degree Examination students registered for

Level SIX

Title: **Environmental Physiology**

Code: **SPS6012**

Semester: **TWO**

Date: **July 2019**

Time: TBC

TIME ALLOWED: **TWO** HOURS

Answer **TWO** questions, each in a **SEPARATE** answer booklet.

1. You are working as an exercise physiologist and one of your male client’s (age = 30 years, body mass = 88 kg) signs up for a charity walking race up Mount Kilimanjaro (Africa). The route your client has chosen will reach an ambient air pressure of 480 mmHg, with a forecasted temperature of 29 °C and relative humidity of 65%. He will walk for 6 hours per day for 6 consecutive days. Your client has 6 weeks to prepare for the race and is able to arrive at the base camp of Kilimanjaro 3 weeks before. Note: this type of walking is estimated at approximately 3.5 METs.

**a)** Provide a summary of the specific strategies you would recommend to the client in order to optimize his performance on the day (50 marks); **b)** Provide justifications for your recommendations i.e. explaining the physiological mechanisms that underpin your advice (50 marks).

1. There are ways in which the heat balance equation can be manipulated. This can work either for or against an athlete during prolonged endurance performance. **a)** Define and describe each part of the heat balance equation (40 marks); **b)** Using the heat balance equation as a reference, where possible, describe how an endurance athletes’ acute physiological responses would help to prevent hyperthermia and fatigue during competition (20 marks); **c)** Describe the mechanisms that explain why hyperthermia causes fatigue among endurance athletes (40 marks).
2. An astronaut must thoroughly prepare for every aspect of space travel. **a)** Describe the stresses placed on the human body during take-off from earth and space entry and suggest ways that an astronaut could prepare for this (25 marks); **b)** Describe some of the reasons for detraining during long-term space visits, discussing skeletal muscle (15 marks), cardiac muscle (15 marks) and bone health (15 marks), as well as strategies that could be used to guard against these effects (30 marks).
3. **a)** Describe what is meant by circadian variation in relation to human physiology and the role of the ‘SCN’ in this regard (30 marks); **b)** Explain how circadian variation can influence the endocrine system (10 marks), the cardiovascular system (10 marks) and metabolism (10 marks). **c)** Describe how circadian variation can affect different types of physical and cognitive performance and how this might influence an athletes’ training plan (40 marks).

**END OF EXAMINATION**