Exercise Physiology Questions Answer Sheet.

1. **Describe how an athlete would make use of the principles of training when designing a training programme aimed at delaying OBLA.**

**(5marks)**

* (Overload): Body must be put under stress/ made to work harder/ longer/ more frequently than usual.
* (Frequency) – At least three times a week
* (Intensity) – 50% - 75% of VO2 max
* (Time) At least 20 minutes
* Type) aerobic and anaerobic training , training interval Fartlek, circuit
* (Progression) – as the body adapts - further increases in frequency/ intensity and time must follow to ensure improvements
* (Specificity) – Training should be relevant/ specific to the sport
* (Reversibility) – Athlete must train consistently to avoid deterioration in performance
* (Moderation) – The need for realistic targets that do not put too much stress on the body too soon
* (Variance) – Varied training session to avoid boredom and maintain interests
* Warm up/ Cool down) Avoid injury and minimise the risk of muscle Sore ness DOMS.

**2. An ergogenic aid is any substance that enhances performance. Discuss the following as aids to enhancing performance**

**- The use of dietary manipulation**

**- Pre competition meals**

**- Post competition meals (6 marks)**

*The use of dietary manipulation*

* Use of carbohydrate loading
* Glycogen stores are depleted a week before competition
* By heavy training/ eating a diet rich is protein/ low in carbohydrates
* 3 -4 days before competition training is reduced and performer eats a diet rich is carbohydrate
* The body compensates for its previous lack of carbohydrate
* Storing more glycogen than before/ increasing glycogen levels
* Benefits endurance athletes
* (Negative effect) – quality of training may be compromised and possible weight gain due to water retention

*Pre Competition meals*

* These could be eaten 2-4 hours before competition
* To ensure that glycogen stores are high
* Glucose can also be eaten immediately before the competition
* Benefits any performer who relies on the breakdown of glycogen for energy e.g. aerobic performer/ games player
* (Negative effect) – If consumed too close to competition can have detrimental effect. Also high blood glucose levels can cause early fatigue

*Post competition meals*

* The optimal time is within 2 hours of end of exercise
* As rate of muscle glycogen replacement is at its quickest
* Eat a carbohydrate rich meal
* Benefits any performer who has used glycogen as their fuel for exercise e.g. aerobic performer/ games player.

**6. What are the benefits of suing Periodisation when designing a training programme?**

**(2 marks)**

- (Timing) helps to ensure that an optimal physiological peak is reached at the correct time for an important event

- (specific component) each block is designed to prepare a specific performance component

- (Variance) Training is therefore spilt into smaller units to maintain motivation and avoid boredom

- Double Periodisation allows the performer to peak for a qualifying round and the championships

**8. Define Aerobic Capacity and list the factors that affect a performer’s VO2 Max**

**(5 marks)**

Definition

* The maximum amount of oxygen that can be taken in and used by the body in one minute/per unit time.

Factors that affect Vo2

* Age
* Gender
* Physiological make up ( genetic factors)
* Training
* Respiratory factors (size of lungs, asthmas ect)
* Cardiac factor ( size of heart, stroke volume)
* Vascular factors (number of red blood cell, number of capillaries)
* Cellular factors ( number of mitochondria/ amount of myoglobin

**9. Outline a training programme designed to improve the aerobic capacity of a performer? (2 marks)**

- Frequency – 3+ times a week

- Intensity – 55%- 85% maximum heart rate/ VO2 max

- Time – More than 20 minutes

- Type – Continuous/ Fartlek/ interval/ circuit/ cross/ altitude

**10. Identify one illegal aid that might be used to enhance Vo2 max and describe the associated risks to a performer health**

**(3 marks)**

* Blood doping – risks of blood contamination/ hepatitis/ aids/ allergic reactions

- Increases blood viscosity/ increased risk of blood clotting/ blood pressure

- Heart failure/ strain

- Decreased heart rate that leads to reduce stroke volume/ cardiac output/ less oxygen the tissues

- EPO - Increases blood viscosity/ increased risk of blood clotting/ blood pressure

- Heart failure/ strain

- Decreased heart rate that leads to reduce stroke volume/ cardiac output/ less oxygen the tissues

- Decreased natural production of EPO that can lead to the body producing less red blood cells in the long term

**12. Define interval training and identify the advantages of this type of training?**

*Definition*

* A form of training in which periods of work are interspersed with periods of recovery

*Advantages*

* Very versatile/ can be used for practically any sport/ flexible training methods
* Can improve both aerobic and anaerobic capacity
* Performer can train relevant to energy system (specificity)
* Allows performer to train at higher intensities without undue fatigue
* Allows for quicker gains in aerobic capacity

**13. Describe how an internal training session can be manipulated to suit the requirement of two different types of performer**

* Duration of work, interval needs to be longer the more aerobic the performer or vice versa
* Intensity of work, interval needs to decrease the more aerobic the performer or vice versa
* Duration of the recovery period needs to decrease the more aerobic or vice the performer or vice versa
* The number of work/ recovery intervals need to decreased the more aerobic the performer or vice versa

**18. Identify and define the type of strength most relevant to a 100m sprinter.**

*Identification*

* Dynamic/ elastic/ explosive strength/ power

*Definition*

* The ability of neuromuscular system to overcome resistance with high speed of contraction/ a combination of strength and speed/ rate at which energy is produced

**18a. Design a weight training programme to improve this type of strength,**

(specificity) Exercise the muscle groups relevant to a 100m sprinter/ Leg curls, leg extensions

- (Overload/Progression) – Increase number of sets/ reps/ decrease rest time/ increase intensity/weight/ frequency

- (Moderation) – do not do to much to soon

- (Frequency) – 3 – 7 times a week

- (Intensity) – 75% - 85% of 1RM

- (Sets) 3- 6

- (Reps) 5- 10

- (Rest) Relief ratio 1.3

**21. Discuss the effects of level of aerobic fitness, availability of oxygen and food fuels on the efficiency of the aerobic energy system**

**(5 marks)**

L*evels of aerobic fitness*

The higher the aerobic fitness of the performer

* The higher the intensity of exercise they can perform using the aerobic system
* This means that can exercise for longer periods of time
* Because they can performer at a higher percentage of their VO2 max before reaching OBLA

*Availability of oxygen*

The higher the aerobic fitness of the performer

* The greater the efficiency of the respiratory system – larger lungs
* The greater the efficiency of the cardiovascular system – larger heart
* Therefore the greater the supply of oxygen to the working muscles
* The more efficient the removal of waste products from the body
* Therefore the more efficient their aerobic energy system

*Availability of food fuels*

* Glycogen is the major fuels for the first 20 minutes of exercise
* Because oxygen supplies are limited
* Fats are a major fuel after 20 minutes of exercise
* The greater stored of glycogen in the muscle/liver the longer the performer can work aerobically
* When glycogen stored are depleted fats can be used to aerobic energy production
* The fitter the performer the earlier they can start to use fats during sub maximal exercise
* Fat requires 15% more oxygen for its breakdown
* And means the athlete can only work at lower intensities
* Once OBLA has been reached the body has insufficient oxygen available to burn fats
* Only carbohydrates can be broken down anaerobically

**28. Discuss the advantages and disadvantages of these types of training, Continuous, Fartlek. (4 marks)**

*Continuous Training – Advantages*

* Low intensity therefore small injury risk
* Easy for specificity runners can run swimmer can swim ect
* Develops muscular endurance
* Can train for long periods of time

*Disadvantages*

* Only trains the aerobic system
* Limitations for team players / anaerobic performers
* Motivation needed
* If a lot of running involved danger of bone and connective tissue damage

*Fartlek training – Advantages*

* Develops aerobic and anaerobic systems
* Easy for specificity e.g. runners can run, swimmers can swim, cyclists can cycle ect
* Develops muscular endurance
* Good for team players

*Disadvantages*

* Risk of injury
* More demanding therefore motivation needed
* If a lot of running involved danger of bone and connective tissue damage