**Specialist Training Questions**

**PNF**

**Explain how a performer uses proprioceptive neuromuscular facilitation (PNF) to increase flexibility (Half of a 14 marker)**

**Technique/method**

A. Can be passive/active

B. Usually involves partner helping

C. Stretch target muscles to limit/full range of movement/ROM

D. Hold (stretched) position for a few seconds

E. Contract muscle group isometrically

F. Muscles relax

G. Stretch target muscles again

H. CRAC (contract/relax/antagonist/contract)

**Physiological explanation (during stretching)**

I. Muscle spindles detect changes in muscle (fibres)

J. Cause stretch reflex

K. Designed to prevent overstretching/protective

L. (Aim of PNF) to override the stretch reflex

M. Golgi Tendon organs/GTO activated/detect overstretching of

muscles

N. (causes) Muscles relax/autogenic inhibition

O. Allows greater range of movement than the initial stretch/greater

range of movement in the training session

**Plyometrics**

**Outline how plyometrics can assist in their preparation to achieve maximum lift at take-off. (Half of a 14 marker)**

Description of activity – hopping/bounding/ depth

jumping/medicine ball work

M. Aim – develop power/speed/explosive strength

N. Involves Fast Twitch Fibres/Type 2

O. Eccentric muscle contraction happens first

P. followed by concentric contraction

Q. Stretch Reflex activated

R. Detected by the muscle spindles

S. Sends nerve impulse to spinal cord/central nervous

system/CNS/afferent impulses

T. Elastic energy stored

U. Protects over stretching of muscles/avoid injury

V. Three phases – stretch shortening cycle

**Periodisation**

**Explain how a swimmer would use ‘periodisation’ to prepare for competitions. *(4 marks)***

*4 marks for 4 of:*

A. Cycle based on World Championships/Olympics

B. Possible to plan for double periodisation

C. Preparation phase/pre season training – involves development of base levels of fitness/general conditioning/quantity rather than quality

D. Competitive phase – refinement of skills/ maintenance of fitness levels/quality rather than quantity/relevant examples of training modifications

E. Tapering/peaking – preparation for specific competition/mainly skill focus

F. Transition phase – active rest/out of season recovery period

G. Macro-cycles – long term planning/yearly/two yearly cycle

H. Meso-cycles – periods of two to eight weeks/months

I. Micro-cycles – periods of a week/day/individual training sessions

**Altitude Training**

**Discuss the suggestion that altitude training always improves performance in endurance events (Half of a 14 marker)**

**Explanation of altitude training**

A. Over 2000m/8000 feet above sea level

B. Usually for at least 30 days/month/3 phases named –

acclimatisation, primary training, recovery

C. Partial pressure of oxygen is lower/less oxygen available

D. Body produces erythropoietin/EPO/hEPO

E. Alternative methods now available, eg hypoxic tents/altitude

tents/oxygen tents/apartments/train low, live high

**Improves Performance**

F. Increased number/concentration/red blood cells

G. Increased concentration of haemoglobin/myoglobin/increased

haematocrit

H. Increased capacity to carry oxygen

I. Increased tolerance to lactic acid/buffering/delayed OBLA

J. Benefits last for up to 6 to 8 weeks.

**Hinders performance**

K. Altitude sickness

L. Training at same intensity difficult/detraining may occur/loss of

fitness

M. Benefits lost within few days back at sea level/up to few days

N. Psychological problems linked to travel/time away from home

**Thermoregulation**

**How does the body regulate temperature when an elite performer is exercising in a warm climate? *3 marks***

1. Transfer heat away from core

2. Vasodilation of blood vessels to the skin

3. Sweating/evaporation

4. Reddening to skin to radiate heat away

5. Conduction and convection

6. Maintains blood plasma

**Thermoregulation is essential in maintaining the correct body temperature.**

**Explain how thermoregulation is achieved by the body during exercise. *(4 marks****)*

*4 marks for 4 of:*

A. Thermoreceptors – detect temperature changes and send messages

B. Thermoregulatory centre/medulla/hypothalamus – receives messages/controls temperature

C. Vasodilation – opening of blood vessels/blood closer to skin

D. Radiation – heat lost by infrared rays/no physical contact needed

E. Conduction – heat lost from (skin) to object/air

F. Convection – heat lost by movement of gases/air

G. Evaporation – heat lost by liquid to vapour/sweating

H. Heat retention – hairs raised/shivering

I. Vasoconstriction – closing of blood vessels/skin capillaries

**RER/Lactate Sampling**

**Elite athletes may use the results from lactate sampling and their respiratory exchange ratio**

**(RER) to ensure their training is effective.**

**Explain the terms lactate sampling and respiratory exchange ratio. *(4 marks)***

*4 marks for 4 of:*

*Sub max of 2 marks*

A. (Lactate sampling) – taking blood samples (to measure the level of lactic acid)

B. Ensures training is at the correct intensity/monitor improvements over time

C. Provides accurate/objective measure

D. Measures OBLA/lactate threshold/occurs at 4 mmols

*Sub max of 2 marks*

E. (Respiratory Exchange Ratio) – ratio of carbon dioxide released compared to oxygen used by the body

F. Estimates use of fats and carbohydrates used during exercise/ calculates energy expenditure

G. Tells if performer working aerobically/anaerobically/energy system used

H. RER close to 1 performer using carbohydrates/close to 0.7 using fats/respiratory quotient

**Glycogen Loading**

**Outline the process of ‘glycogen loading’ that may be used by performers to improve performance in this type of event. (Half of a 14 marker)**

Aim to increase (muscle) glycogen stores/ supercompensation

Delays fatigue/increases endurance capacity/ increased ATP/energy production/hitting the wall

 (**Method 1**) Reduce glycogen levels

Achieved by increased endurance training

Following three days of low carbohydrate diet

And tapering/reduction in training levels

Few days before competition high carbohydrate level diet/ eg pasta

Trained/elite/equiv athletes may rest for several days

before eating high carbohydrate diet

Increased water consumption helps the process

 (**Method 2**) day before 3 minute high intensity exercise

Carb window opens

Immediately/within 20 minutes intake high carbohydrate diet