

# Mark Scheme (Results) Summer 2007

GCE

## GCE Physical Education (6726) Paper 01



**Unit 6: Scientific Principles of Exercise and Performance (6726)**

**Section A: Exercise and Energy Systems**

<b>1</b>	<b>(a)</b>	<b>(i)</b>	<p>Define the concepts of energy and power and give the unit of measure for each.</p> <ol style="list-style-type: none"> <li>1. Energy is defined as force x distance or work done/energy changes states/forms</li> <li>2. Is measured in joules or KJ</li> <li>3. Power is energy used/by time taken or force x velocity</li> <li>4. Is measured in watts.</li> </ol>	<b>(4)</b>
		<b>(ii)</b>	<p>Calculate the power output of an athlete who has travelled 1500m in 2 minutes on a cycle ergometer with a fixed load resistance of 10kg attached.</p> <ol style="list-style-type: none"> <li>1. Power (watts) = energy used ÷ time taken</li> <li>2. Energy = force X distance</li> <li>3. Energy = (10 kg X 10) (to produce a gravitational weight) X 1500m = 100(N) X 1500(m)</li> <li>4. Energy = 150,000/147,150/14,000(J)</li> <li>5. Power = 150 000 ÷ 120 seconds = 1250/1226.25/1225 watts.</li> </ol>	<b>(5)</b>
	<b>(b)</b>	<b>(i)</b>	<p>Explain the <b>all or none</b> law in relation to strength of muscular contraction.</p> <ol style="list-style-type: none"> <li>1. If muscle fibres are to contract they must receive an electric impulse/action potential</li> <li>2. If the action potential is not generated there will be no contraction</li> <li>3. If the action potential reaches the muscle fibres then those fibres will contract</li> <li>4. Only the fibres stimulated will contract, and they will contract maximally</li> <li>5. Increased numbers of motor units are stimulated will produce more force.</li> </ol>	<b>(3)</b>

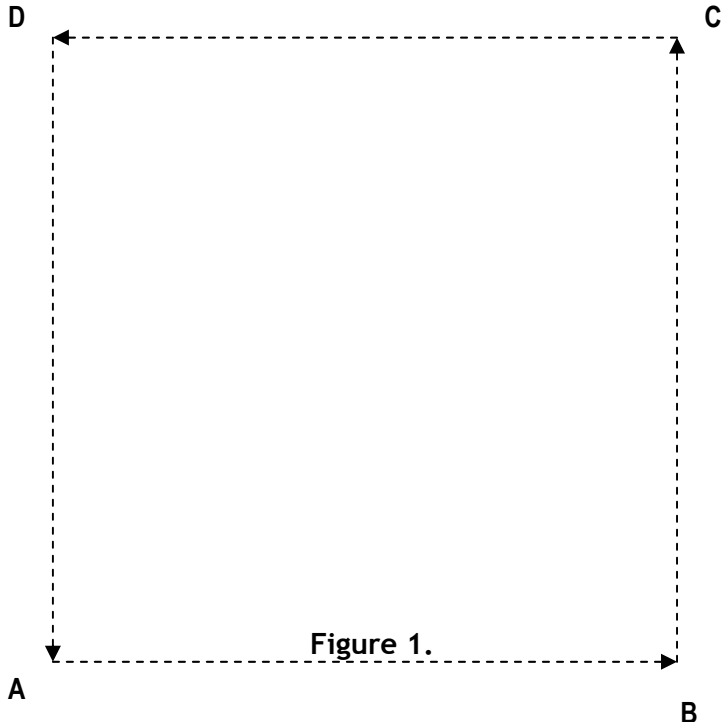
	<p>(ii) Explain the sequence of events that cause a muscle to contract according to the <b>sliding filament theory</b>. (7)</p> <p>Stage 1:</p> <ol style="list-style-type: none"> <li>1. when the action potential reaches the sarcomere the motor end plates are depolarised</li> <li>2. this depolarisation causes <math>\text{Ca}^{2+}</math> to be secreted from the "T" vessels within the cells sarcoplasm/saracoplasm reticulum.</li> </ol> <p>Stage 2:</p> <ol style="list-style-type: none"> <li>3. calcium binds to troponin</li> <li>4. tropomysoin complex moves/changes</li> <li>5. this leaves active sights on the actin exposed</li> <li>6. at the same time the myosin cross bridge is energised by the breakdown of ATP</li> <li>7. the result is that the actin and myosin attach/myosin binds to active site/cross bridge is formed.</li> </ol> <p>Stage 3:</p> <ol style="list-style-type: none"> <li>8. myosin head tilts towards the centre of the sarcomere/power stroke</li> <li>9. which causes the actin to move towards the centre of the sarcomere/slide over the myosin/sarcomere gets smaller or similar description or reference to movement of bands/changing distance of Z bands</li> <li>10. this cross bridge is immediately broken and then recreated as long as calcium is present</li> <li>11. ATP is also essential to energise the myosin to facilitate the release of the cross bridge</li> <li>12. ratchet mechanism.</li> </ol>	
	<p>(c) In the context of ATP breakdown and re-synthesis, define the terms exothermic, endothermic and coupled reactions and give an example of each. (6)</p> <ol style="list-style-type: none"> <li>1. Exothermic = giving off</li> <li>2. eg the splitting of PC in the presence of Creatine Kinase gives off energy</li> <li>3. Endothermic = taking in</li> <li>4. eg the use of the energy to rebuild the ATP compound</li> <li>5. Coupled reactions coupling the needs of two reactions</li> <li>6. eg energy being given off serves the need of the next stage</li> <li>7.</li> </ol> <p>ATP <math>\xrightarrow{\text{Atpase}}</math> ADP + pi + energy (exothermic reaction)</p> <p>PC <math>\xrightarrow{\text{Creatine Kinase}}</math> Pi + energy (exothermic reaction) (coupled reaction)</p> <p>energy + pi + ADP <math>\xrightarrow{\text{Creatine Kinase}}</math> ATP (endothermic reaction)</p>	

(Total 25 Marks)

2	(a)	<p>Explain how a neural impulse is transferred from the central nervous system to skeletal muscle.</p> <ol style="list-style-type: none"> <li>1. Impulse detected at the motor neurone pool</li> <li>2. Dendrites conduct the impulse into the cell body</li> <li>3. If the impulse is large enough/depolarisation is large enough/above threshold it continues/all or none law</li> <li>4. The now concentrated/stronger impulse travels away from the cell body along the axon towards muscle fibres</li> <li>5. The impulse is protected and speeded up by the presence of the insulating myelin sheath</li> <li>6. Speed of conduction is increased further at the Nodes of Ranvier as the impulses jump across the gaps in the myelin sheath</li> <li>7. The action potential at a given point in the axon produces a diffusion of Sodium ions (Na<sup>+</sup>)/Potassium ions (K<sup>+</sup>)</li> <li>8. This enables further transmission of the impulse/</li> <li>9. The message travels along the axon to the synaptic knobs/axon terminals/neuromuscular junction</li> <li>10. Here acetylcholine is secreted into the synaptic cleft/synapse</li> <li>11. Acetylcholine is the neurotransmitter which allows the motor end plate to depolarise.</li> </ol>	(7)
	(b)	<p>The body utilises three energy pathways to re-synthesise ATP.</p>	
	(i)	<p>Name the <b>three</b> pathways and describe how each works.</p> <p>Max of 3 per pathway.</p> <ol style="list-style-type: none"> <li>1. ATP-PC/alactic pathway</li> <li>2. Creatine Kinase catalyses the breakdown of PC into P<sub>i</sub> + C + energy</li> <li>3. The energy is used to recreate ATP from the P<sub>i</sub> and the residue ADP</li> <li>4. Lactic acid pathway</li> <li>5. Glycolysis</li> <li>6. Glucose is broken down in the presence of glycolytic enzymes producing 2 x ATP &amp; 2 mmolls of pyruvic acid</li> <li>7. Aerobic energy pathway</li> <li>8. Respiration</li> <li>9. The pyruvic acid is broken down to acetal coenzyme A/oxaloacetic acid/enters Kreb's cycle to produce up to 36 additional ATP's.</li> </ol>	(9)

	(ii)	<p>Identify a sporting activity that would utilise each pathway as its primary energy provider and explain why.</p> <p>Sub max of 2 per pathway.</p> <p>ATP-PC/alactic pathway:</p> <ol style="list-style-type: none"> <li>1. shot put</li> <li>2. very short duration activity requiring maximal intensity.</li> </ol> <p>Lactic acid pathway:</p> <ol style="list-style-type: none"> <li>3. 200m</li> <li>4. lasts longer than the 10secs or so that can be primarily fuelled by the ATP - PC pathway and at an intensity greater than that which can be fuelled by the aerobic pathway.</li> </ol> <p>Aerobic energy pathway:</p> <ol style="list-style-type: none"> <li>5. 10,000m track race</li> <li>6. intensity is lowered to cater for the longer duration and the body can provide significant contributions to the required ATP aerobically.</li> </ol>	(6)
	(c)	<p>Define the term <b>OBLA</b> and describe how an athlete may use this knowledge.</p> <ol style="list-style-type: none"> <li>1. OBLA is the “Onset of Blood Lactate Accumulation”</li> <li>2. Is the point at which lactate levels within the blood meet or exceed 4mmolls</li> <li>3. Associations have been made with this level of blood lactate levels and a drop off/decline in performance</li> <li>4. Is the point at which lactic acid production is greater than the bodies’ capacity to utilise/remove it</li> <li>5. Links to anaerobic/training thresholds/HR/intensities</li> <li>6. Perform just below, at or just above</li> <li>7. Train just above to raise lactate threshold/anaerobic threshold</li> <li>8. Train to increase buffering.</li> </ol>	(3)
(Total 25 Marks)			

Section B: Sports Mechanics and Sports Psychology

3	 <p style="text-align: center;">Figure 1.</p>		
	<p>Figure 1 shows the path of a ball as it is passed along the ground, around a square in a football practice, between the players A, B, C and D. Each side of the square is 15m in length.</p>		
	(a)	Showing all your workings, if the ball starts at player A, calculate:	
	(i)	<p>The distance the ball has travelled when it reaches C.</p> <p>1. 30m</p>	(1)
	(ii)	<p>The displacement of the ball as it reaches C.</p> <p>Sub max of 2 for size/magnitude.</p> <ol style="list-style-type: none"> <li>1. Magnitude/size = <math>\sqrt{15^2 + 15^2}</math></li> <li>2. = <math>\sqrt{225+225} = \sqrt{450}</math></li> <li>3. = 21.21m.</li> </ol> <p>1 mark for direction.</p> <ol style="list-style-type: none"> <li>4. Along the diagonal of the square, at 45 degrees to the left of B/or equivalent.</li> </ol>	(3)
	(iii)	<p>The displacement of the ball as it completes one circuit.</p> <p>1. Displacement = 0</p>	(1)

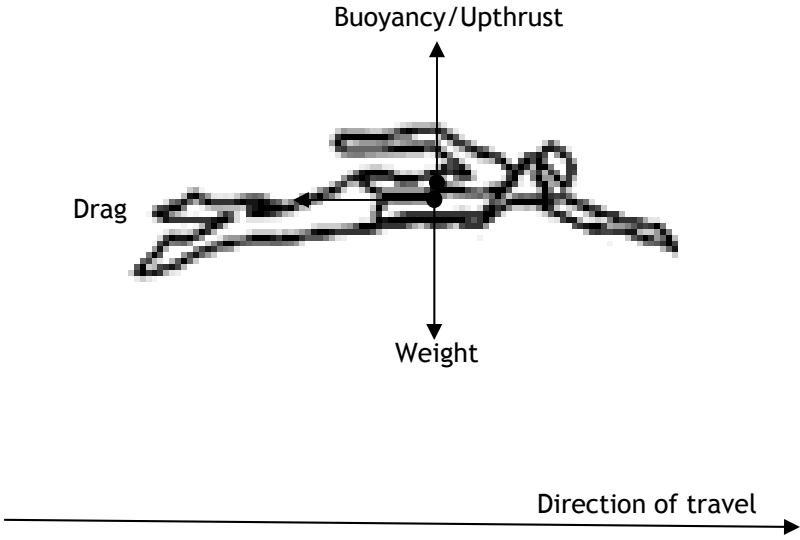
	(b) (i)	<p>It takes the ball 2 seconds to travel from C to D.</p> <p>Calculate the average speed of the ball as it moves from C to D.</p> <ol style="list-style-type: none"> <li>1. Average speed = distance/time taken = 15/2</li> <li>2. Average speed = 7.5ms<sup>-1</sup> (no units/incorrect units, no mark).</li> </ol>	(1)				
	(ii)	<p>The speed of the ball is measured as it leaves D and as it arrives at A, and the values below are recorded.</p> <table border="1" data-bbox="427 517 1054 591"> <tr> <td data-bbox="427 517 740 555">Speed at D</td> <td data-bbox="740 517 1054 555">Speed at A</td> </tr> <tr> <td data-bbox="427 555 740 591">10 ms<sup>-1</sup></td> <td data-bbox="740 555 1054 591">6 ms<sup>-1</sup></td> </tr> </table> <p>It takes the ball 1.9 seconds to travel from D to A.</p> <p>Calculate the average acceleration of the ball between the two points.</p> <ol style="list-style-type: none"> <li>1. Average acceleration = (final speed - initial speed)/time taken</li> <li>2. Average acceleration = (v-u)/t = (6 - 10)/1.9 = -4/1.9</li> <li>3. Average acceleration = -2.11 ms<sup>-2</sup> (no units/incorrect units, no mark for answer).</li> </ol>	Speed at D	Speed at A	10 ms <sup>-1</sup>	6 ms <sup>-1</sup>	(2)
Speed at D	Speed at A						
10 ms <sup>-1</sup>	6 ms <sup>-1</sup>						
	(iii)	<p>State Newton's Second Law, and use it to explain your answer to part (b) (ii).</p> <ol style="list-style-type: none"> <li>1. The acceleration of a body/the rate of change of momentum of a body is proportional to the force causing it and takes place in the direction in which the force acts/F=ma</li> <li>2. The resultant acceleration is negative/the ball is slowing down</li> <li>3. Therefore the resultant force must be acting against the direction of travel/friction/air resistance is slowing the ball down.</li> </ol>	(3)				



	<p>(iv) State Newton's First and Third Laws, and use them to explain the motion of the ball in the above practice. <span style="float: right;">(6)</span></p> <p>Sub max of 3 per law.</p> <p>1<sup>st</sup> law:</p> <ol style="list-style-type: none"> <li>1. every body at rest, or moving with constant velocity in a straight line, will continue in that state unless compelled to change by an external force exerted upon it</li> <li>2. there must be a force acting upon the ball because the velocity is not constant</li> <li>3. the velocity is not constant because friction/air resistance is slowing the ball down</li> <li>4. the force applied to the ball by the player kicking it causes it to move from being at rest</li> <li>5. the force applied by a player controlling/kicking the ball causes its motion to change.</li> </ol> <p>3<sup>rd</sup> law:</p> <ol style="list-style-type: none"> <li>6. for every action, there is an equal and opposite reaction</li> <li>7. the force exerted on the ball by the player is equal but opposite to the force exerted on the player by the ball</li> <li>8. the force exerted by the ball on the ground is equal and opposite to the force exerted by the ground on the ball/or equivalent.</li> </ol>	
(c)	<p>(i) Draw and label a diagram that shows air resistance, lift and drag acting on a discus in flight in relation to its direction of travel. <span style="float: right;">(3)</span></p> <div style="text-align: center;"> </div> <p>(Forces must act on the discus and away from the discus).</p> <ol style="list-style-type: none"> <li>1. 1 mark for correctly identifying lift</li> <li>2. 1 mark for correctly identifying drag in relation to throw</li> <li>3. 1 mark for correctly identifying air resistance in relation to throw.</li> </ol>	

		<p>(ii) Explain how lift force is achieved in discus and how it can be optimised.</p> <ol style="list-style-type: none"> <li>1. Discus must be angled to achieve lift</li> <li>2. Air flow over top of discus has high velocity = low pressure</li> <li>3. Air resistance along the bottom of the discus has lower velocity = high pressure</li> <li>4. This creates a pressure difference</li> <li>5. Objects move from high pressure to low pressure = lift</li> <li>6. The greater the velocity of the object the greater the air flow, the greater the lift</li> <li>7. Optimum angle of attack increases lift, whilst minimising drag.</li> </ol>	<b>(5)</b>
<b>(Total 25 marks)</b>			

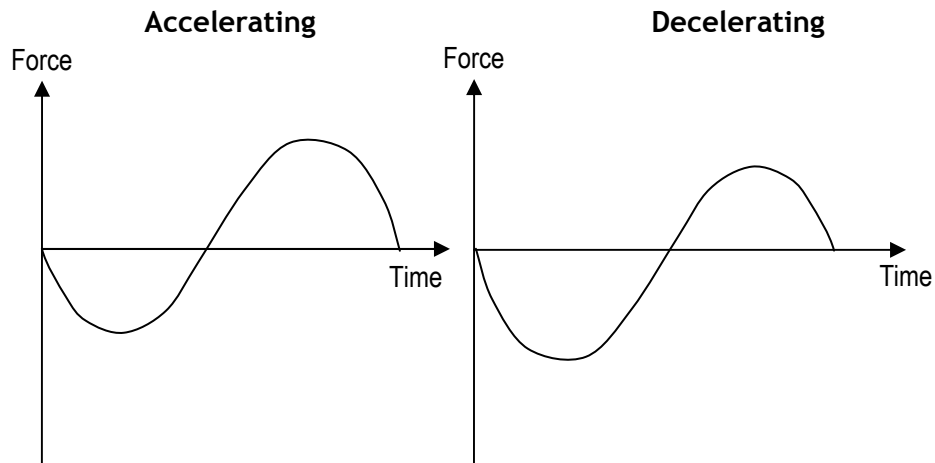
4	(a)	<p>Identify the body's <b>three</b> axes of rotation and use sporting examples to explain the movement that occurs around each one.</p> <p>No examples - no marks for explanations.</p> <p>Max of 3 for identifying. Max of 3 for appropriate examples.</p> <ol style="list-style-type: none"> <li>1. Frontal/lateral axis (line from side to side across the body)/or equivalent</li> <li>2. Forward roll/any example that would be observable from the side that involves whole body movement</li> <li>3. Sagittal/transverse/dorso-ventral axis (line from front to back through the body)/or equivalent</li> <li>4. Cartwheel/any example that would be observable from the front/back that involves whole body movement</li> <li>5. Vertical/longitudinal axis (line from head to toe) or equivalent</li> <li>6. A pirouette in ice skating/spinning movements that are viewed from the top that are whole body movements/rotation/medial/lateral rotation.</li> </ol>	<b>(6)</b>
	(b)	<p>Explain how back spin influences a ball's flight.</p> <p>Back-spin:</p> <ol style="list-style-type: none"> <li>1. airflow over bottom of ball in opposite direction of spin</li> <li>2. airflow on bottom of ball has low velocity therefore higher pressure</li> <li>3. airflow over top of ball in same direction as spin</li> <li>4. airflow over top of ball has high velocity and therefore lower pressure</li> <li>5. resultant vertical force acting upwards on ball/Magnus effect</li> <li>6. ball will move from area of high pressure to low pressure/which pushes ball upwards</li> <li>7. so ball stays in air slightly longer quicker</li> <li>8. therefore ball has to be hit slightly lower initially to stop it going out/long</li> <li>9. therefore ball has to be hit with less force to stop it going out/long.</li> </ol> <p>Appropriate labelled and explained diagram is acceptable.</p>	<b>(6)</b>

(c)	(i)	<p>Label the diagram below to show the external forces acting on a swimmer in relation to the direction of motion. <b>(3)</b></p>  <p>1. 1 mark for correctly identifying buoyancy  2. 1 mark for correctly identifying drag in relation to travel  3. 1 mark for correctly identifying weight.</p>	
	(ii)	<p>There are a number of strategies that a swimmer uses in order to minimise the effects of one of these forces. <b>(5)</b></p> <p>Identify which force the swimmer attempts to minimise and explain how the swimmer can reduce this force.</p> <p>1 mark for correctly identifying force.</p> <ol style="list-style-type: none"> <li>1. Swimmer attempts to minimise drag.</li> </ol> <p>Max of 4 for explanation.</p> <ol style="list-style-type: none"> <li>2. Minimise frontal resistance by maintaining optimal body position</li> <li>3. Minimise frontal resistance by keeping limbs in streamlined position/stop them sticking out laterally/to the side too much</li> <li>4. Wearing appropriate swimwear reduces fluid/skin friction</li> <li>5. Shaving/removal of body hair is an attempt to reduce skin friction</li> <li>6. Minimise parts of body moving through surface of water to reduce surface friction.</li> </ol>	

(d) During the time a sprinter's foot is in contact with the ground it experiences different forces. (5)

Draw **two** force/time graphs:

- one to show the force acting on the foot as the athlete accelerates
- one to show the force acting on the foot as the athlete decelerates



Max of 3 for accelerating.

1. Correct shape of graph/s-curve
2. Initially force is negative
3. positive force is larger than negative/area of positive force is larger than area of negative positive.

Max of 3 for decelerating.

4. Correct shape of graph/s-curve
5. Initially force is negative
6. Negative force is larger than positive/area of negative force is larger than area of positive force.

(Total 25 marks)

5	<p>(a) Using examples from sport, define the terms <b>aggression</b>, <b>instrumental aggression</b> and <b>assertion</b>.</p> <p>Sub max of 2 for each.</p> <table border="1" data-bbox="352 320 1281 488"> <thead> <tr> <th>Aggression</th> <th>Instrumental aggression</th> <th>Assertion</th> </tr> </thead> <tbody> <tr> <td>1.intent to harm</td> <td>4.Intent to harm</td> <td>7.No intent to harm</td> </tr> <tr> <td>2. outside the rules/laws</td> <td>5.Inside the rules/laws</td> <td>8.Inside the rules/laws</td> </tr> <tr> <td>3. suitable eg</td> <td>6. Suitable eg</td> <td>9. Suitable eg</td> </tr> </tbody> </table>	Aggression	Instrumental aggression	Assertion	1.intent to harm	4.Intent to harm	7.No intent to harm	2. outside the rules/laws	5.Inside the rules/laws	8.Inside the rules/laws	3. suitable eg	6. Suitable eg	9. Suitable eg	(6)
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	<p>(b) List <b>five</b> strategies a coach can use to reduce aggressive behaviour in a player.</p> <p>5 marks for 5 of:</p> <ol style="list-style-type: none"> <li>1. introduce cathartic strategies</li> <li>2. control arousal by managing stress</li> <li>3. teach relaxation</li> <li>4. somatic techniques</li> <li>5. teach selective attention/concentration/channelling aggression</li> <li>6. put player in non-aggressive situation position</li> <li>7. remove player/substitution</li> <li>8. punish player</li> <li>9. reinforce desired behaviour/non aggressive/assertive</li> <li>10. show non aggressive role models</li> <li>11. encourage positive non aggressive team ethos/emphasise that aggressive play will punish whole team/let the team down</li> <li>12. imagery/visualisation</li> <li>13. self talk</li> <li>14. player behaviour contract/goal setting</li> <li>15. counselling.</li> </ol>	(5)												
	<p>(c) Explain how a coach would structure their practice sessions if they were applying the cognitive approach to learning.</p> <p>5 marks from:</p> <ol style="list-style-type: none"> <li>1. skills would be practiced as a whole/not broken down into parts/sub-routines/holistic approach</li> <li>2. trial and error practice would be used</li> <li>3. to encourage performers to solve problems</li> <li>4. the coach would use appropriate reinforcement depending upon the outcome</li> <li>5. the coach would also explain why they are performing certain skills/why the skill should be performed in a certain way</li> <li>6. this will allow the performer to develop an understanding of what they are doing and why</li> <li>7. insight will happen/Eureka moment</li> <li>8. the coach would need to set up practices so rewards/enjoyment is possible because learning takes longer using this method and de-motivation is possible</li> <li>9. allow time for discussion to help players work out solutions.</li> </ol>	(5)												

	<p>(d) Explain the effect that the presence of others may have on sports performance.</p> <p>5 marks from:</p> <ol style="list-style-type: none"> <li>1. increased arousal due to presence of others</li> <li>2. increased anxiety as a result of increased arousal/make nervous/make mistakes/social inhibition</li> <li>3. might try harder/social facilitation</li> <li>4. dominant response will occur/beginners make more mistakes/experts perform better</li> <li>5. evaluation apprehension/worried about what the audience thinks of performance</li> <li>6. audience will have greater effect if they are seen as important by the performer</li> <li>7. co-action affect/co-active audience will increase arousal levels</li> <li>8. distraction effect</li> <li>9. effect on attention band/focus on attention</li> <li>10. proximity effect.</li> </ol>	<b>(5)</b>
	<p>(e) Name <b>four</b> strategies that a performer or coach could use to manage the effect of a crowd on performance.</p> <p>4 marks from:</p> <ol style="list-style-type: none"> <li>1. somatic techniques/centring</li> <li>2. progressive muscular relaxation</li> <li>3. breathing techniques</li> <li>4. reduce physical activity to allow arousal levels to reduce</li> <li>5. cognitive techniques/positive thinking</li> <li>6. self talk</li> <li>7. visualisation/mental rehearsal/imagery</li> <li>8. target setting</li> <li>9. attention/selective attention</li> <li>10. thought stopping</li> <li>11. practice with distractions</li> <li>12. hypnosis.</li> </ol>	<b>(4)</b>
<b>(Total 25 marks)</b>		

6	(a)	<p>Identify and explain <b>one</b> method of <b>personality assessment</b>, highlighting the drawbacks of your chosen method.</p> <p>1 mark for identified method.</p> <ol style="list-style-type: none"> <li>1. Interview/psychometric test/questionnaire/Cattells 16PF/SCAT/Eysenck)/observation.</li> </ol> <p>1 mark for explanation of test.</p> <ol style="list-style-type: none"> <li>2. Results analysed to give profile/behaviour recorded and analysed/discussion and analysis.</li> </ol> <p>Max of 3 marks for disadvantages from:</p> <ol style="list-style-type: none"> <li>3. ambiguous questions/vague questions</li> <li>4. analysis of results takes time</li> <li>5. very subjective/results/questions can be interpreted differently by different people</li> <li>6. subjects may lie/self serving bias</li> <li>7. gives socially desirable answers/gives answers they think they should/is expected</li> <li>8. may behave differently in real situations as opposed to lab conditions</li> <li>9. mood/emotionality may effect results</li> <li>10. observer may not interpret behaviour correctly</li> <li>11. misinterpretation of answers/questions</li> <li>12. culturally specific questions.</li> </ol>	(5)
	(b)	<p>Bandura suggested that self-efficacy is influenced by <b>four</b> factors.</p> <p>Define these four factors.</p> <ol style="list-style-type: none"> <li>1. Performance accomplishments: having prior success/failure</li> <li>2. Vicarious experience: observing others of a similar/lesser ability successfully complete the activity/skill they are attempting</li> <li>3. Verbal persuasion: verbal encouragement by significant others</li> <li>4. Emotional arousal: arousal/anxiety will effect feelings of confidence/being able to control arousal/anxiety.</li> </ol>	(4)



	(c)	<p>What is <b>learned helplessness</b> and how can it be overcome? Use examples from sport to support your answer.</p> <p>Max of 3 from:</p> <ol style="list-style-type: none"> <li>1. feeling that failure is inevitable/having no control over negative events</li> <li>2. can be for specific situations/links to self efficacy/state or can be global/for all sports/competition/trait</li> <li>3. perpetuates/enhanced if performance outcomes are incorrectly attributed to internal and stable factors.</li> </ol> <p>Max of 3 from:</p> <ol style="list-style-type: none"> <li>4. attributional re-training</li> <li>5. attribute good performances to internal-stable factors eg ability</li> <li>6. attribute good performance to internal-unstable factors eg high effort/good preparation</li> <li>7. attribute poor performances to external factors eg referee/luck</li> <li>8. attribute poor performances to internal-unstable factors eg low effort/poor preparation</li> <li>9. manipulate box of control/internal/unstable factors</li> <li>10. concentrate/reflect on performance rather than outcome</li> <li>11. use of stress management techniques</li> <li>12. set SMART targets.</li> </ol>	(5)
	(d)	<p>(i) According to the multi-dimensional approach, anxiety is made up of more than one component.</p> <p>Explain how each component is related to sports performance.</p> <p>3 marks from:</p> <ol style="list-style-type: none"> <li>1. cognitive state anxiety</li> <li>2. somatic state anxiety</li> <li>3. self-confidence</li> <li>4. trait anxiety.</li> </ol> <p>3 marks from:</p> <ol style="list-style-type: none"> <li>5. cognitive anxiety is directly, negatively proportionally related to performance. Performance is best when cognitive anxiety is low/performance is worst when cognitive anxiety is high</li> <li>6. somatic anxiety relationship to performance is that of an inverted 'U'/Low/high levels of somatic anxiety lead to poor performance/optimum levels of arousal lead to best performance</li> <li>7. levels of self confidence is related to anxiety/low self confidence is more likely to suffer from anxiety/high self confidence is less likely to suffer from anxiety</li> <li>8. high trait anxiety will suffer higher levels of state anxiety/low trait anxiety will be less likely to develop state anxiety/tendency to be nervous in most situations.</li> </ol>	(6)

		<p>(ii) Suggest strategies for managing pre-competition anxiety.</p> <ol style="list-style-type: none"> <li>1. Centring - cognitive and somatic</li> <li>2. Progressive muscular relaxation - cognitive and somatic</li> <li>3. Breathing techniques - somatic</li> <li>4. Reduce physical activity to allow arousal levels to reduce - somatic</li> <li>5. Positive thinking - cognitive</li> <li>6. Self talk - cognitive</li> <li>7. Visualisation - cognitive and somatic</li> <li>8. Target setting - cognitive</li> <li>9. Attention/selective attention/focus on relevant cues - cognitive</li> <li>10. Thought stopping - cognitive</li> <li>11. Disassociation/change perspective e.g. 'not a final'</li> <li>12. Association/conditioning eg tunnel vision.</li> </ol>	<b>(5)</b>
<b>(Total 25 marks)</b>			

*The responses for this section are marked out of 25, but section C will be given twice the weighing in accordance with the specification.*

## **Section C: A Synoptic Analysis of Scientific Principles**

- 7 Discuss the various long term strategies undertaken by elite athletes in preparation for global competitions.

Skill acquisition:

- technique Work
- manipulation of training to enhance skill development
- variety of practice conditions
- adoption of feedback methods to aid technique and skill development
- set plays/routines.

Sports psychology:

- motivational techniques
- aggression control
- stress management techniques
- arousal control
- anxiety control
- strategies to improve confidence
- focus control/mental rehearsal
- target setting/SMART(ER)
- team cohesion.

Exercise & training:

- fitness testing
- gap analysis/target weaknesses
- planning of training cycles
- detailed individual training programme
- variety of training methods/acclimatisation training.

Exercise and energy systems:

- establishment of thresholds/OBLA/Lactate threshold
- manipulation of recovery process
- controlled diet
- target of structural and functional adaptations.

Sports mechanics;

- work with specific equipment/tailor made equipment & clothing
- force analysis
- technique analysis
- work with body position/streamline/aerodynamics.

Socio-cultural aspects:

- media exposure
- funding/sponsorship/endorsements
- work at sports academies/sports institutes.

**(Total 25 marks)**

8 Discuss the view that elite athletes are born, not made.

Skill acquisition:

- inherited abilities/genetics
- access to more advanced feedback methods.

Sports psychology:

- highly qualified sports psychologists
- able to use a variety of psychological techniques to cope with stress/success/failure
- personality types
- nature vs nurture
- aggressive/ assertive tendencies.

Exercise & training:

- structure of body more suited to sporting performance
- access to better training facilities
- access to hypoxic chambers/hydrostatic pools etc
- living/born at altitude gives advantage
- more accurate fitness assessment
- more precise and reliable fitness monitoring equipment/techniques
- rehabilitation is quicker due to advance technology.

Exercise and energy systems:

- establishment of thresholds/OBLA/Lactate threshold is more accurate
- monitoring of recovery process
- controlled diet/scientifically controlled nutrition
- assessment and monitoring of structural and functional adaptations is more accurate
- highly qualified sports physiologists
- physiological make up means athletes are more suited to use of certain energy systems
- due to muscle fibre make up
- which also means they can recover from physical activity faster / more efficiently

Sports mechanics:

- work with specific equipment/tailor made equipment & clothing
- more technologically advanced assessment and monitoring equipment
- access to best biomechanists
- genetic make up means that internal levers are more effective than those of others.

Socio-cultural aspects:

- media exposure
- funding/sponsorship/endorsements
- full time athletes as opposed to part time
- work at sports academies/sports institutes/access to institutes of sports
- full time, year round support from back up team
- access issues
- gender Issues.

(Total 25 marks)

9 Discuss how modern technology aids an athlete's preparation for competition.

Skill acquisition:

- variety of feedback techniques allows weaknesses to be highlighted and targeted
- machinery/equipment now allows recreation of sporting environment in order to make practice more specific
- tailored equipment to maximise efficient technique.

Sports psychology:

- advanced technology allows monitoring of stress levels/arousal/anxiety.

Exercise & training:

- ability to re-create any training environment without having to travel
- advanced fitness assessment methods.

Exercise and energy systems:

- precise establishment of thresholds is now possible
- ability to target specific structural and functional adaptations
- able to produce food supplements/nutritional supplements that control the diet.

Sports mechanics:

- tailor made equipment & clothing
- advanced materials
- technique analysis is now instant/virtual models can now be created
- body position/streamline/aerodynamics is now extremely advanced.

Socio-cultural aspects:

- media coverage is now advanced/hawkeye/ultra-motion/'pocket cam'/'stump-cam'
- interactive viewing is moving sport into the home/more accessible in the home.

**(Total 25 marks)**

- 10 Discuss what an athlete would do during the final 72 hours prior to competition in order to maximise performance.

Skill acquisition:

- rehearsal of routines and set plays
- game plan.

Sports psychology:

- mental rehearsal
- stress management/arousal control/anxiety control
- coping strategies
- focus/changing personality
- aggression control.

Exercise & training:

- tapering of training schedule
- appropriate warm up routine.

Exercise and energy systems:

- suitable recovery period between final session and competition
- appropriate sleep
- replenishment of all energy stores  
dietary manipulation to ensure readiness for competition/  
hydration.

Sports mechanics:

- appropriate clothing for conditions of competition
- appropriate equipment for conditions of competition.

Socio-cultural aspects:

- press conferences/media interviews
- learn/rehearse national anthem/expressions of national pride.

**(Total 25 marks)**

Mark Band	Description	Likely Characteristics
22 - 25	The essay synthesises information from <b>all relevant study areas</b> to answer the question in full. There is some in-depth analysis and balanced <b>debate of the issues</b> with <b>correct use of technical language</b> and factual information throughout, demonstrating a clear understanding of the subject matter. <b>A range of accurate practical examples predominantly taken from relevant scientific units</b> supports the vast majority of points.	A well structured essay with continuous prose. Predominantly accurate use of spelling, punctuation and grammar. Correct use of terminology. Clear, concise and relevant throughout.
18 - 21	The essay synthesises information from <b>most of the relevant study areas</b> to address the key issues raised in the question. A good understanding is demonstrated through a <b>good use of technical language, some detailed analysis and balanced debate</b> of key points. Factual information and accurate examples, <b>many taken from relevant scientific units</b> , are used in support of points made.	A well structured essay with predominantly accurate use of spelling, punctuation and grammar. Correct use of terminology. Clear and concise but may occasionally make an irrelevant comment.
14 - 17	The answer synthesises information from a <b>limited number of study areas</b> in an attempt to address the key issues raised in the question. A sound understanding is demonstrated through the use of <b>some technical language</b> , factual information and <b>relevant practical examples</b> , some of which are taken from scientific units. Some analysis and debate is evident, although this may be <b>lacking both in depth and balance</b> .	An obvious attempt to structure the essay. Fundamentally sound use of terminology. Generally clear and concise with limited inaccuracies. Satisfactory spelling, punctuation and grammar.
10 - 13	An essay that addresses a <b>limited number of key issues</b> but lacks the <b>depth of synoptic rigour</b> required. There is <b>little evidence of analysis and technical language</b> , although some <b>basic understanding of the subject area</b> is demonstrated. Relevant points may be supported by examples but only partially developed.	A basic structure is evident. Some incorrect use of terminology. There may be errors in spelling, punctuation and grammar. A number of inaccuracies.
7 - 9	An essay that <b>fails to address many parts of the question</b> . There is <b>little evidence of synoptic analysis</b> with <b>sweeping statements</b> that may contain some relevant information but <b>generally remain unsupported by evidence or accurate examples</b> and suggest limited understanding. Irrelevant points and repetition may be used to pad out the answer.	A poorly structured essay in which there may be errors in spelling, punctuation and grammar. Incorrect use of terminology. A significant proportion of material is irrelevant.
0 - 6	<b>An essay that mostly fails to address the question and contains many inaccuracies and irrelevancies.</b> Very little evidence of synoptic analysis with statements that demonstrate a lack of understanding.	A poorly structured essay. Incorrect spelling, punctuation and grammar. Incorrect use of terminology. Many inaccuracies.

