

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT: SPORTS SCIENCE

BACHELOR OF SCIENCE HONOURS DEGREE IN SPORTS SCIENCE AND MANAGEMENT

SSM 217 BIOMECHANICS

DURATION: 3 HOURS

TOTAL MARKS: 100

INSTRUCTIONS TO CANDIDATES

Answer **two** questions from Section and **two** questions from Section B.

NOV 2024

Section A

1. Discuss the application of sports biomechanics in

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|--------------------------|------------------|
| a) Technique enhancement | (6 marks) |
| b) Sports injuries | (6 marks) |
| c) Equipment manufacture | (4 marks) |
| d) Ergonomics | (4 marks) |

2. Distinguish between

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|--|------------------|
| a) kinematic and kinetic biomechanical variables | (2 marks) |
| b) qualitative and quantitative biomechanics | (4 marks) |

c) A long jumper of mass 58 kg, accelerates from rest to reach a peak velocity of 20 m/s in 4 seconds. He then takes off the board at an angle of 45 degrees to the vertical and reaches a maximum vertical height of 1.5m.

Calculate

- | | |
|---|------------------|
| i) His acceleration during the run up | (3 marks) |
| ii) The horizontal distance he covers in his jump | (3 marks) |
| iii) The greatest Potential Energy he acquires | (3 marks) |
| iv) His greatest Kinetic Energy at the moment of peak velocity | (3 marks) |
| v) The distance from the start after which he acquires maximum velocity | (2 marks) |

3. Describe the following concepts as use in sports biomechanics. Use examples from sports

a) weight b) inertia c) momentum d) angular velocity e) friction

f) coefficient of restitution g) lever arm h) parabola i) off-centre force j) upthrust
(20 marks)

SECTION B

1a) A basketball coach notices that one of his players is very poor at the free throw. The coach tasks a Sports Science student to investigate the faults of this player on this shot and improve the shot. Describe a biomechanical strategy the student can use to complete the assignment he has been given. (15 marks)

1b) Describe a strategy that you can use as a sports scientist to promote the uptake of biomechanical practise in the Zimbabwe national teams. (15 marks)

i) State Newton's 3 Laws of motion (6 marks)

ii) Explain the application of Newton's 1st, 2nd and 3rd Laws of motion in:

a) execution of a corner kick in soccer (6 marks)

b) playing a rally in tennis serve (6 marks)

c) performing a dive (6 marks)

d) generating force for propulsion in swimming (6 marks)

3. National Associations in Zimbabwe run numerous coaching courses few of which include a biomechanics component.

a) in your opinion why do you think biomechanics is excluded? (5 marks)

b) using your knowledge of biomechanics suggest the content that can be included in such courses
(10 marks)

c) Suggest a strategy that you can adopt to ensure that biomechanics is included in all such courses at national level (15 marks)

END OF PAPER