

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

SSC2104

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF SPORTS SCIENCE AND COACHING

THEORY: SSC2104: BIOMECHANICS

FEBRUARY 2010

3 HOURS (100 MARKS)

INSTRUCTIONS

Answer **four** questions only. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labeled diagrams.

1.
 - a) Outline the methods used for collecting kinematic data. (10 marks)
 - b) Using examples, explain how the reference system is used in analysing Biomechanical data. (15 marks)
2. A softball is thrown with a velocity of 22.5m/s at an angle of 56° from a height of 1.7m.
Calculate
 - (i) Vertical and horizontal components (4 marks)
 - (ii) Time to peak trajectory (3 marks)
 - (iii) The height of the trajectory from point of release (4 marks)
 - (iv) Total height of parabolla (3 marks)
 - (v) Time from apex to ground (3 marks)
 - (vi) Total flight time (4 marks)
 - (vii) Range of throw (4 marks)
3. With the aid of mathematical formulae outline the relationships between:
 - a) Linear and Angular displacement (8 marks)
 - b) Linear and Angular velocity (8 marks)
 - c) Linear and Angular acceleration (9 marks)
4.
 - a) What are the horizontal and vertical components of a force with a magnitude of 50N acting at 34° to the horizontal. (15 marks)

- b) The horizontal and vertical components of a force are 47.23N and 28.56N respectively what is the magnitude of the resultant force. (10 marks)
5. a) Using sporting examples, outline the following concepts
- (i) Moment of inertia (5 marks)
 - (ii) Angular momentum (5 marks)
- b) Using a graph describe the angular momentum, moment of inertia and angular velocity of a diver completing an aerial sommersault. (15 marks)
6. A projectile (ball) is projected straight vertically upward and it falls back to the earth. Outline the changes in potential energy (PE) and kinetic energy (KE) at different stages of the trajectory. (25 marks)

END OF EXAMINATION