**12366 dnk201e dynamics - sample problems 3**



**Problem 1: (15p)** The tennis ball is struck with a horizontal velocity , strikes the smooth ground at *B*, and bounces upward at . Determine the initial velocity , the final velocity , and the coefficient of restitution between the ball and the ground.

2.28 m

6 m



**Problem 2: (25p)** In the speed-governing mechanism , (rods *AB* have negligible mass), , , . Determine at that instant and the tension in the rod.



0.3 m

0.3 m

***B***

***C***

**Problem 3:** **(30p)** If link *CD* has an angular velocity of ,

***E***

1. determine the velocity of point *B*,

5 m

0.6 m

1. and determine the acceleration of point *B*.

***D***

***A***



**Problem 4:** **(30p)** A ladder is assumed to be a uniform bar which starts sliding without frictional resistance. Determine the forces at *A* and *B*.

Kinematics and Kinetics of a Particle:

|  |  |  |  |
| --- | --- | --- | --- |
| Coordinates | Position  | Velocity  | Acceleration  |
| Rectangular |  |  |  |
| Polar |  |  |  |
| Cylindrical |  |  |  |
| Spherical |  |  |  |

Tangential and normal components: ,

Radius of curvature:

Work-energy principle:

Work of a force:

Power:

Conservative force: , Conservation of mechanical energy:

Time rate of change of linear momentum:

Time rate of change of angular momentum: ,

Angular impulse:

Kinematics of Rigid Bodies:

Velocities in general plane motion:

Accelerations in general plane motion:

Kinetics of Rigid Bodies in Plane Motion: