Chapter # 10 (Collisions)

1- A 2.00 kg object moving with a speed of 3.00 m/s collides with a 1.00 kg object initially at rest. Immediately after collision, the 2.00 kg object has a velocity of 1.73 m/s directed 30 deg from its initial direction of motion. What is the speed of the 1.00 kg just after collision?
[3.46 m/s]

2- A 3.0 kg object (A), moving at 8.0 m/s in the positive x direction, makes a head-on elastic collision with an object B, of mass=M, initially at rest. After the collision, object B has a velocity of 6.0 m/s in the positive x direction. What is the value of M?
[5.0 kg]

3- A 2.0-kg object moving with a speed of 5.0 m/s in the positive x-direction collides and sticks to a 3.0-kg object originally moving with a speed of 2.0 m/s in the same direction. What is the final speed of the two masses ? [3.2 m/s]

4- Two 2.0-kg bodies, A and B, collide. Before collision the velocity of body A is (10i + 20j) m/s and after the collision body A moves with velocity (-5.0i + 10j) m/s. Find the magnitude of the impulse delivered to body B. [36 kg.m/s]

5- A 20-g bullet is fired into a 100-g wooden block initially at rest on a horizontal frictionless surface. If the initial speed of the bullet is 10 m/s and it comes out of the block with a speed of 5.0 m/s, find the speed of the block immediately after the collision. [1.0 m/s]

6- A bullet of mass 30.0 g traveling at 600 m/s penetrates 12.0 cm into a block of wood. What average force it exerts on the block? [45 x 10^3 N]

7- A 4000-kg freight car, moving at 4.0 m/s, collides and couples with a 6000-kg freight car, which was initially at rest. The common final speed of these two cars is:
[1.6 m/s]

8- A 3.00-g bullet traveling horizontally at 400 m/s hits a 3.00-kg wooden block, which is initially at rest on a smooth horizontal table. The bullet buries itself in the block without passing through. The speed of the block after the collision is: [0.40 m/s]

9- Blocks A and B are moving toward each other. A has a mass of 2.0 kg and a velocity of 50 m/s, while B has a mass of 4.0 kg and a velocity of 25 m/s. They suffer a completely inelastic collision. The kinetic energy dissipated during the collision is: [3750 J]

10- Body A has a mass of 5 kg and a velocity of + 2 i m/s. Body B has a mass of 3 kg and a velocity of 2 i m/s. The two bodies collide head-on and the collision is completely inelastic. Find the loss in kinetic energy due to the collision. [15 J]