**Instructions**

1. **The test contains 4 questions.**
2. **Marks will be awarded for partially correct answers also.**

**Q1**: block of mass *m =* 2.00 kg is released from rest *h =* 0.500 m from the surface of a table, at the top of a 30.0° incline as shown in Figure . The frictionless incline is fixed on a table of height *H =* 2.00 m. (a) Determine the acceleration of the block as it slides down the incline. (b) What is the velocity of the block as it leaves the incline? (c) How far from the table will the block hit the floor? (d) How much time has elapsed between when the block is released and when it hits the floor? (e) Does the mass of the block affect any of the above calculations? 10 Marks



**Q2**: Two blocks of mass 3.50 kg and 8.00 kg are connected by a string of negligible mass that passes over a frictionless pulley (Fig. ). The inclines are frictionless. Find (a) the magnitude of the acceleration of each block and (b) the tension in the string. 10 Marks



Q3: A block of mass 3.00 kg is pushed up against a wall by a force P that makes a 50.0° angle with the horizontal as

shown in Figure. The coefficient of static friction between the block and the wall is 0.250. Determine the

possible values for the magnitude of P that allow the block to remain stationary. 10 Marks



Q4: A pilot of mass *m* in a jet aircraft executes a loop-the-loop, as shown in Figure. In this maneuver, the aircraft moves in a vertical circle of radius 2.70 km at a constant speed of 225 m/s. Determine the force exerted by the seat on the pilot (a) at the bottom of the loop and (b) at the top of the loop. Express your answers in terms of the weight of the pilot *mg.* 10 Marks

