

## **MECHANICS EXAM, IPSH 2009-10**

The following items are listed as a guide for what to focus on during your studies. You must bring a calculator and no.2 pencil to the exam. An equations sheet will be provided.

---

- Be able to convert between metric units. Be able to convert between imperial and metric units.
- Be able to express numbers in scientific notation.
- Understand and be able to apply Newton's 1<sup>st</sup> Law of Motion.
- What is inertia?
- Be able to apply the Equilibrium Rule to different situations, including free body diagrams. Be able to determine the net forces of a system using a free body diagram.
- Know the difference and be able to give examples of something in static vs. dynamic equilibrium.
- Be able to interpret graphs of velocity, acceleration, and distance.
- Be able to calculate acceleration without given force or mass.
- How are speed and velocity different from each other? Be able to apply and give examples. Be able to calculate speed/velocity.
- Be able to apply Newton's 2<sup>nd</sup> Law.
- Be able to explain and apply free fall and terminal velocity.
- Be able to mathematically determine speed of free fall, average speed of free fall, and distance of fall.
- Understand and be able to explain mass vs. weight. Be able to convert between kg, N, and pounds.
- Be able to explain and apply Newton's 3<sup>rd</sup> Law of Motion.
- What is momentum (mathematically and operationally)?
- Be able to calculate momentum.
- Understand and be able to solve problems using the conservation of momentum.
- What is impulse? How do you calculate impulse?
- Understand the difference between the two types of collisions.
- Know that energy of a system = PE + KE
- Know how potential energy and kinetic energy are related and how to calculate each.
- Understand and be able to explain how energy is transferred using the conservation of energy.
- What is work? What is power? How are they related?
- Be able to calculate work and power.
- Be able to explain and identify the six different types of simple machines.
- Be able to identify input & output forces, input & output distances when using simple machines. Use that information to quantify mechanical advantage.
- Understand that work input equals work output for ideal simple machines. Apply that knowledge when quantifying mechanical advantage.