|  |  |  |
| --- | --- | --- |
| PHYSICS 201  Equations Sheet | Translational Motion | Rotational Motion |
| LINEAR | ANGULAR |
| Time | t | t |
| Displacement | x; (x = rθ) | θ |
| Velocity | v = Δx/Δt; (v = rω) | ω = Δθ/Δt |
| Acceleration | a = Δv/Δt; (a = rα) | α = Δω/Δt |
| Kinematic Equations | v = v0 + at | ω = ω0 + αt |
| x = ½(v + v0)t | θ = ½(ω + ω0)t |
| x = v0t + ½ at2 | θ = ω0t + ½ αt2 |
| v2 = v02 + 2ax | ω2 = ω02 + 2αθ |
| Inertia | *m* = mass | *I* = Rotational inertia; |
| To create | force = F | torque = τ = LA·F |
| Newton's second law of motion | Σ**F** = m**a** | Σ**τ** = I**α** |
| Σ**F** = Δ**p**/Δt | Σ**τ** = Δ**L**/Δt |
| Work | *F·x* | *τ·θ* |
| Kinetic Energy | Translational Kinetic Energy = TKE = ½ mv2 | Rotational Kinetic  Energy = RKE = ½ Iω2 |
| Momentum | **p** = m·**V** | **L** = I·**ω** |
| Conservation of momentum | Σmivi = Σmfvf | ΣIiωi = ΣIfωf |

Frictional force = *Ffr=μkFN* Centripetal force =

Hooke’s law: Elastic PE = EPE =

Pressure = Force/Area Pabs = Patm + PG Density = Mass/Volume

Pressure (P) due to depth h of fluid of density ρ; P = ρgh.

1 atm = 1.013 x 105 N/m2 = 76 cm.Hg = 760 mm.Hg

The density of the air is 1.29 kg/m3; Density of water = 1000 kg/m3 = 1 g/cm3; Acceleration due to gravity = g = 9.8 m/s2.

Areas: Acircle = π r2 Asphere = 4π r2 Arec=length x width; Atriangle= 0.5 x base x height.  
  
Volumes: Vrec=length x width x height Vcyl. = π r2h; Vsphere = (4/3) π r3.

Study Guide for Final: Study the Materials from T1, T2, and T3.

Chapter 11: Fluid Statics

Density, pressure, pressure at depth h, barometer, atmospheric pressure, gauge pressure, absolute pressure, Pascal’s principle, and Archimedes’ principle.

1. Distinguishing absolute pressure from gauge pressure.
2. Measuring the atmospheric pressure.
3. Calculating pressure due to depth of fluid.
4. Study the problems in the Archimedes’ principle lab hand-out.

Fluid Dynamics  
 1. Bernoulli’s equation  
 

Chapter-16: Hooke’s law and Simple Harmonic Motion

1. Hooke’s law, period, frequency, and amplitude.
2. Elastic potential energy.
3. Pendulum and resonance.
4. Oscillating mass on a spring.

Chapter 17: Waves and Sound  
  
1. Waves: Define and give examples for transverse wave, longitudinal wave, and both.  
2. Periodic wave:   
a. Define periodic wave, period (T), frequency (f), wavelength (λ), and wave speed.  

b. Show a periodic wave as a function of time and distance.

3. Speed of a wave on a string: The **speed of a wave** depends on the properties of the medium in which the wave travels. For a transverse wave on a string that has a tension *FT* and a mass per length *m*/*L*, the wave speed is, (which will be given):

 (given)

4. The nature of sound waves in air: Type, frequency, intensity, and wave form.

, I0 = 10-12 W/m2. (given)

5. Problem solving with transverse and longitudinal standing waves.