

Engineering Physics

Physics

Nudger

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Tutorials

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Rotational Mechanics

1. What is the definition of moment of inertia? [309]
2. What is the moment of inertia equation for: a solid wheel; a circular hoop; a solid ball; and a hollow ball? [310]
3. What is a common error when defining the terms in the moment of inertia equation?
4. What are the units to moment of inertia? [310]
5. Derive the equation $a = r\alpha$. [312]
6. What is the difference between torque and moment? [317]
7. Derive the torque equation. [317]
8. Derive the angular work done equation. [318]
9. What is a flywheel? [321]
10. What is a flywheel battery? [321]
11. How could you increase the moment of inertia of a flywheel without increasing its mass? [322]
12. What might happen to a flywheel if its angular velocity becomes too high? [322]
13. What methods are used to reduce energy losses in flywheels? [322]
14. How does a flywheel smooth torque and angular velocity? [323]
15. List five uses for flywheels. [323]
16. What are the advantages and disadvantages of flywheels compared to other methods for storing energy? [324]
17. What is the principle of conservation of angular momentum? [325]
18. What is the angular impulse equation? [326]
19. Why does an ice skater's angular velocity increase when they pull in their arms during a spin? [326]

Thermodynamics

20. What is a non-flow process? [331]
21. Give four examples of non-flow processes. [331-334]

22. What determines the adiabatic constant? [332]
23. Why are adiabats steeper than isotherms? [335-337]
24. Draw a p-V curve for three isotherms of increasing temperature. [335]
25. What is an internal combustion engine (ICE)?
26. What is an external combustion engine (ECE)?
27. What is the Carnot cycle and what does it represent?
28. What is the Diesel cycle and what does it represent? [342]
29. What is the Otto cycle and what does it represent? [342]
30. What is the Stirling cycle?
31. What is a two-stroke engine?
32. What is the Second Law of Thermodynamics and how does it apply specifically to heat engines? [348]
33. Draw the heat engine energy flow diagram. [348]
34. What is the heat engine efficiency equation? [349]
35. What is the heat engine maximum efficiency equation? [349]
36. What is a CHP plant? [349]
37. What is a reversed heat engine? [351]
38. Derive the COP equations for heat pumps and refrigerators. [352]
39. What are the maximum theoretical COP equations for heat pumps and refrigerators? [352-353]
40. Derive the '+1' relationship between COP equations for heat pumps and refrigerators.