

ChatGPT

Sure, I'll translate the tasks for you:

1. A car with a frontal area of 3 m^2 travels at a speed of 100 km/h powered by an engine with 20 kW . How large is the air resistance force on the car? (A formula for a pocket calculator is sufficient; ignore other losses; round to reasonable values.)
2. At a height of 100 m , the average wind speed is 9 m/s , and at a height of 10 m , it's 5 m/s . Can the roughness length in the logarithmic wind profile be 0.1 m ? Provide a calculation-based explanation!
3. The wind speed v has the probability density sketched below. (a) What is the height of the probability density where the wind speed $v = 5 \text{ m/s}$? (b) What is the probability that v is up to 5 m/s ? (c) What is the probability that v is exactly $7,000 \dots \text{ m/s}$?
equals
bessere Werte?
4. How many meters of the top rotor blade tip of an offshore wind turbine with a total height of 300 m are visible from a beach 20 km away? (A formula for a pocket calculator is sufficient; use common approximations.)
5. "Hydropower is environmentally friendly." Describe three aspects that can be argued for or against this statement. (three sentences)
6. Wind turbines are considered a very cost-effective way of producing electrical energy. Why are there still funding gaps in the billions of Euros in Germany's power supply?
7. A wind turbine of a certain type can optionally be built on a plain or on a small hill where the wind speed is 2% higher and the air density is 5% lower than on the plain at any time. Where is the yield higher? Provide a calculation-based explanation!
8. Describe three advantages or disadvantages of three-bladed wind turbines compared to those with fewer blades (e.g., two) or more blades (e.g., twenty). (three sentences)
9. Why are wind turbines that are based on drag (for example, a cup anemometer) usually less efficient than those based on lift? (approx. three sentences)
10. A sound source is located in a huge room with width and length but a low ceiling. The room has a concrete floor and ceiling with no sound insulation. Consider the sound pressure level at distances of 20 m and 40 m from the sound source.

Ry How many decibels will these two sound pressure levels differ? Provide a calculation-based explanation!

11. A generator is connected to the stiff 20-kV network via an overhead line. This line has an ohmic resistance of 0.5Ω per kilometer and an inductance of 1.5 mH per kilometer. The generator can be overexcited from $\cos(\varphi) = 0.95$ lagging to $\cos(\varphi) = 0.95$ leading. It currently has an apparent power of 1 MVA . The voltage at the generator is currently 400 V greater than in the stiff network. How long can the overhead line be at maximum? (A formula for a pocket calculator is sufficient. It is assumed that the voltage difference is relatively small.)

12. The pipe that leads into a water turbine has the same diameter as the pipe that leads out of the water turbine. Both pipes run horizontally at the same height. Can the turbine generate energy? If yes, how? If not, why not? (approx. three sentences)

*"einfacher als
"iblich" fühlen*

Claude

Here is a translation of the physics problems into English:

1. A car with a frontal area of 3 m^2 travels at a speed of 20 kW with 100 km/h . How large is the drag coefficient of the car? (Formula for pocket calculators provided; ignore losses; choose unknown quantities sensibly.)

2. The wind at 100 m height has an average speed of 9 m/s and at 10 m height 5 m/s . Can the roughness length in the logarithmic wind profile then be equal to 0.1 m ? Justify your answer!

3. The wind speed v has the sketched probability density shown below. (a) What is the height of the probability density at $v = 5 \text{ m/s}$? (b) What is the probability that v lies between 5 m/s and 7 m/s ? (c) What is the probability that v is exactly $7.0000 \dots \text{ m/s}$?

4. How many meters of the uppermost rotor blade tip of an offshore wind turbine with 300 m total height and 20 km offshore must be sighted for tachometer use? (Formulas provided; use the usual approximations.)

5. "Hydropower is environmentally friendly." Describe three aspects that speak for or against this statement. (three sentences)

6. Wind turbines are a very worthwhile type of production of electrical energy. Why does it make sense in Germany's power

supply to financially support them in the range of 2 to 4 billion Euro? (ca. 1/2 page)

7. A certain type of wind turbine can be built either on the plain or on a small hill, where the wind speed is always 2% higher and the air density 5% lower than on the plain. Which location yields the greater recoverable power? Justify your answer!

8. Describe three advantages or disadvantages of three-bladed wind turbines compared to those with fewer rotor blades (e.g. two) or more (e.g. twenty). (three sentences)

9. Why are wind turbines that are based on the lift principle (almost always) built with horizontal axis of rotation and not with vertical axis? (ca. three sentences)

10. A sound source is located in a wide and long rising space with stronger decay. The room has reverberation times of about 3s. Consider the sound pressure levels at 20m and 40m distance from the sound source. How much will these two sound levels differ approximately? Justify your answer!

11. A generator is connected to a 20-kV network via a transmission line with a resistance of 0.542 pro Kilometer and an inductance of 1.5 mH per kilometer. The generator can be underexcited from $\cos(\varphi) = 0.95$ to $\cos(\varphi) = 0.95$ overexcited. It currently has an apparent power of 1MVA. The voltage at the generator is currently 400 V greater than the voltage in the rigid network. How long can the transmission line be? (Formulas provided. The quantities are to be used as given, even if the difference in voltage is relatively small.)

12. The pipe into which a water turbine flows has the same diameter as the pipe out of which the water turbine flows. Both pipes run horizontally at the same height. Can the turbine generate energy? If yes: How? If no: Why not? (ca. three sentences)

Gemini

1. A car with a frontal area of 3m^2 is driving at a power of 20kW with 100 km/h. How big is the drag coefficient of the car? (Formula for pocket calculator is enough; ignore losses; choose unknown quantities sensibly.)

2. The wind has an average speed of 9m/s at a height of 100m and 5m/s at a height of 10m. Can the roughness length in the logarithmic wind profile be 0.1 m then? Computational justification!

3. The wind speed v has the probability density sketched below. (a) What is the height of the probability density at $v = 5\text{m/s}$? (b) What is the probability that v is up to 5m/s ? (c) What is the probability that v is exactly $7.0000\dots\text{m/s}$?

besser Vorben!

Probability density

0
0
10
15
20

} auch alles aus dem Diagramm, ok!

v in m/s

4. How many meters of the top rotor blade tip of an offshore wind turbine with a total height of 300m are visible from the 20km distant beach? (Formula for pocket calculator is enough; use the usual approximations.)

5. "Hydropower is environmentally friendly." Describe three aspects that speak for or against this statement, respectively. (three sentences)

6. Wind turbines are considered a very inexpensive way of generating electricity. So why are there still financing gaps of tens of billions of euros in Germany's electricity supply? (approx. three sentences)

7. A wind turbine of a certain type can be built either on the plain or on a small hill, where the wind speed is 2% higher at any time and the air density is 5% lower than on the plain. Where is the yield greater? Computational justification!

8. Describe three advantages or disadvantages of three-bladed wind turbines over those with fewer rotor blades (eg two) or more rotor blades (eg twenty). (three sentences)

9. Why are wind turbines that are based on drag (eg a cup anemometer) generally less efficient than those that are based on lift? (approx. three sentences)

10. A sound source is located in a room that is huge in width and length with a low ceiling. The room has a concrete floor and concrete ceiling with no soundproofing. Consider the sound pressure levels at 20m and 40m away from the sound source. By how many decibels will these two sound levels differ? Computational justification!

more than

200m

• Sound source

more than 200m

11. A generator is connected to the rigid 20-kV grid via an overhead line. This line has an ohmic resistance of 0.52 per kilometer and an inductance of 1.5mH per kilometer. The generator can be underexcited from $\cos(\phi) = 0.95$ to overexcited from $\cos(\phi) = 0.95$. It currently has an apparent power of 1MVA . The voltage at the generator is currently 400V greater than the voltage in the rigid network. How long can the overhead line be at maximum? (Formula for pocket calculator is enough; The information is single-phase as

Ω

before. As usual, take advantage of the fact that the voltage difference is relatively small.)

12. The pipe that leads into a water turbine has the same diameter as the pipe that leads out of the water turbine. Both pipes run horizontally at the same height. Can the turbine gain energy? If yes: How? If no: Why not? (approx. three sentences)

Turbine

aus dem Bild, ok

generat