

Exemplar examination paper

Question 1

Say whether the given statement is TRUE or FALSE.

- 1.1 If the pressure of a gas increase, the molecular velocity of the gas will decrease. (1)
 - 1.2 If the molecular mass of a substance increases, then the substance's rate of diffusion will decrease. (1)
 - 1.3 Capillary rise in hair tubes can be reduced by increasing the surface tension of the liquid in it. (1)
 - 1.4 If two similar bodies A and B are at the temperatures of 50C and 100 C respectively, then B will radiate twice as much energy as A. (1)
 - 1.5 A diffraction grating is used to polarise light. (1)
 - 1.6 Frequency is the distance taken for the completion of one wave. (1)
 - 1.7 One wavelength is the distance taken to complete one oscillation. (1)
 - 1.8 A sugar solution will turn a ray of light. (1)
 - 1.9 A far-sighted person needs a concave lens to see close by. (1)
 - 1.10 Magnetic flux density is measured in tesla. (1)
 - 1.11 In transformers the winding ratio is the same as the current ratio. (1)
 - 1.12 A negative charge experiences a force in the opposite direction to the direction of the field. (1)
 - 1.13 Sound travels faster in air than in steel. (1)
 - 1.14 The higher the pulling force on a string the higher is the frequency of the sound. (1)
 - 1.15 Sound that travels 100 m in 0.3 seconds has a velocity of 30 m/s. (1)
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Question 2

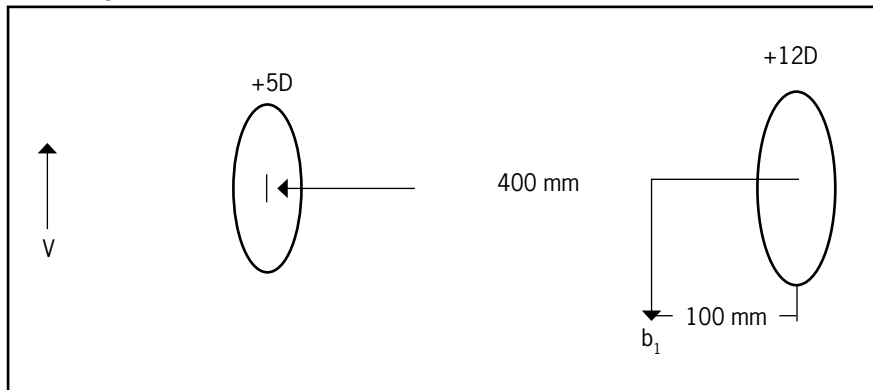
Answer the following question(s) in your own words.

- 2.1 Write short notes on:
 - 2.1.1 adhesion (2)
 - 2.1.2 Cohesion (2)
 - 2.1.3 Viscosity (2)

- 2.2 During an experiment to investigate Charles' law, the following results were obtained:

Volume in m ³	0,5	1	B
Temperature in K	800	A	2 400

- 2.2.1 Find the possible values of A and B. (2)
- 2.2.2 Draw a graph which best describes Charles' law. (2)
- 2.3 40 g of a gas has a volume of 0,0008 m³ at a pressure of 250 kPa and a temperature of 120 °C.
The gas is allowed to expand to 108 kPa when the volume is 0,06 m³. If the $C_v = 1,74$ kJ/kg.K calculate the:
- 2.3.1 Gas constant for this gas (2)
- 2.3.2 Final temperature (2)
- 2.3.3 Change in the internal energy (3)
- 2.3.4 Work done by the gas while expanding (3)
- 2.4 The following figure, shows a combination of lenses with the front lens +5 dioptres and 400 mm and the second lens with a strength of +12 dioptres. Calculate the following:



- 2.4.1 Where the object V must be placed to give an image b_1 100 mm from the second lens. (4)
- 2.4.2 The position of the second image b_2 . (4)
- 2.4.3 The final enlargement of the lens combination. (4)
- 2.5 A current-carrying conductor, 0,5 m long, moves at 0,2 m/s perpendicular to a magnetic field of 3 tesla (Wb/m²). The resistance in the conductor is 4 Ω . Calculate the following:
- 2.5.1 The induced emf (2)
- 2.5.2 The current through the conductor (2)
- 2.5.3 The force on the conductor (2)

Question 3

Answer the following questions in your own words.

- 3.1 Calculate the distance that must be between two ends of a rod to carry over 2 J/s of energy from one end to the other end if the rod has a diameter of 15 mm and the one end is at 10 °C and the other end at 300 °C. The conductivity constant K of the rod is 80 W/m. (4)
- 3.2 Explain the construction of a Nicol prism with the help of a neat drawing. (4)
- 3.3 Calculate the illumination intensity of a light of 80 cd at a point 70 cm away. (2)
- 3.4 Calculate the force T with which a string must be pulled to vibrate with a frequency of 240 Hz at fundamental tones if the string is 0,75 m long and has a mass of 1 g. (4)
- 3.5 Explain the meaning of and give the SI units for each symbol in the formula below:

$$v = \sqrt{\frac{3R_0T}{M}}$$
 (8)
- 3.6 A transformer has 2 400 turns on the secondary side and delivers 600 V. Calculate the turn ratio (primary : secondary) if the supply voltage is 220 V. (5)
- 3.7 Give ONE use of the Wattmeter (2)
- 3.8 Name THREE media through which sound can be transmitted and give ONE example of each. (3)
- 3.9 Calculate the velocity at which sound is transmitted through a copper bar if: and the copper has a density of. (2)
- 3.10 A tuning fork of 600 Hz resonates with an open tube. Calculate the shortest possible length of the tube if the velocity of air and sound is 300 m/s. (4)

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Question 4

Answer the following questions in your own words.

- 4.1 Name TWO rays that occur during polarisation of double refraction. (2)
- 4.2 Name TWO kinds of lenses. (2)
- 4.3 What is a magnetometer used for? (1)
- 4.4 Give the SI-unit of force between two magnetic poles. (1)
- 4.5 Give the SI-unit of electrical energy consumption. (1)
- 4.6 Give the SI unit of power. (1)
- 4.7 Give the SI-unit of velocity of sound (1)

[9]

Total: 100 marks