AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

MODEL EXAMINATION PAPER 2018

Physics Paper II

Time: 2 hours 10 minutes Marks: 50

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are FOURTEEN questions. Answer ALL questions. Questions 13 & 14 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue correcting fluid, or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a scientific calculator if you wish.

Q.1. (Total 3 Marks)

Show that $2aS = v_f^2 - v_i^2$ is dimensionally correct.

Q.2. (Total 4 Marks)

Describe the 'head to tail rule' of vector addition. In this rule, can vectors be placed in any order of succession? Why?

Q.3. (Total 4 Marks)

Identify and discuss the principle used in airbags, truck's arrestor beds and bending your knees when you jump off a chair and land on the ground.

Q.4. (Total 4 Marks)

List any FOUR sources of non-conventional energy.

1. _____

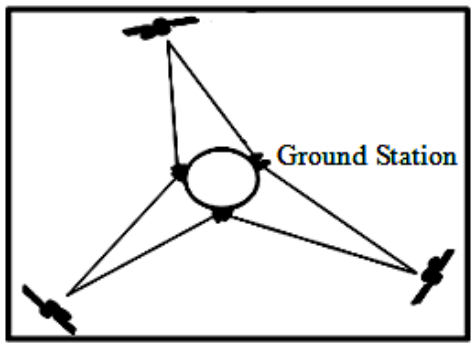
2. _____

3. _____

4. _____

Q.5. (Total 3 Marks)

a. Describe geostationary satellites with respect to the given diagram. (2 Marks)



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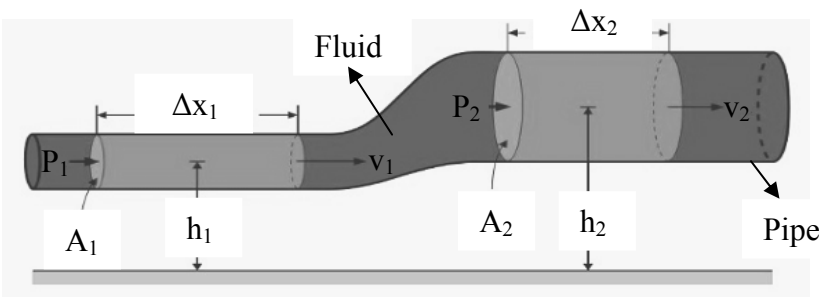
b. 'Artificial gravity can be produced when a manned-satellite revolves around the Earth.' Give any ONE reason to support the given statement. (1 Mark)

_____

_____

Q.6. (Total 3 Marks)

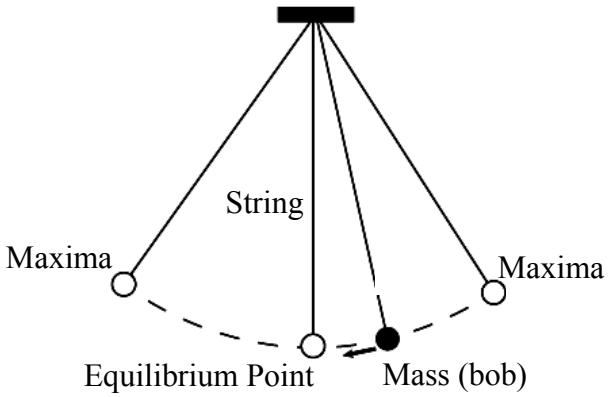
a. By looking at the given diagram of a pipe, write an appropriate equation for the fluid flow. (1 Mark)



b. To understand the features of fluids in motion, the behaviour of fluids should satisfy three conditions. State any TWO of these conditions. (2 Marks)

Q.7. (Total 2 Marks)

A simple pendulum consists of a point mass (bob) suspended by a weightless and inextensible string from a fixed support.



Mention TWO factors on which time period of simple pendulum depends.

1. _____

2. _____

Q.8. (Total 2 Marks)

Describe any TWO characteristics of simple harmonic motion.

_____

_____

_____

_____

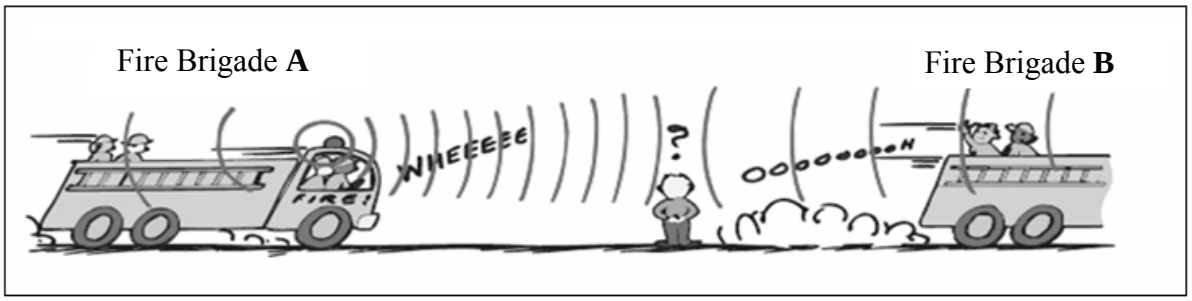
Q.9. (Total 4 Marks)

'A radar works to determine the elevation and speed of an airplane using the principle of Doppler's effect.'

Explain the working of a radar system with the help of the given statement.

Q.10. (Total 4 Marks)

Consider two fire brigade trucks, **A** and **B**, accelerating after each other with the same speed and generating the sound of same frequency. Nearby, a listener is standing, as shown in the given diagram.

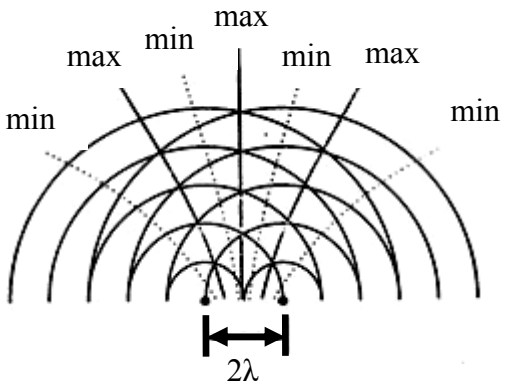


i. To the listener, which fire brigade truck would appear to have lesser sound frequency?

ii. With reference to the stationary listener, write the mathematical expression of the apparent frequencies of sound produced by fire brigade **A** and fire brigade **B**.

Q.11. (Total 3 Marks)

a. Identify the phenomenon of light shown in the given diagram. (1 Mark)



b. Define the phenomenon identified in part (a). (1 Mark)

c. State any ONE condition required for the occurrence of this phenomenon. (1 Mark)

Q.12. (Total 4 Marks)

A Carnot heat engine with an efficiency of 65% absorbs heat from a reservoir at 590 K. Calculate the exhaust temperature of the engine.

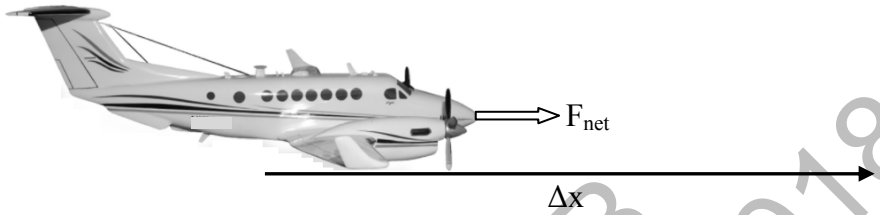
Q.13. (Total 5 Marks)

EITHER

a. Suppose a car of mass 1200 kg is moving with velocity of 27.5 m/s. If the engine is applying a uniform force of 3500 N, then calculate power of the car at the end of 8^{th} second.

OR

b. A constant force (F_{net}) acts on an airplane of mass (m) and it covers a distance (Δx) with an increase in its velocity from (v_i) to (v_f).

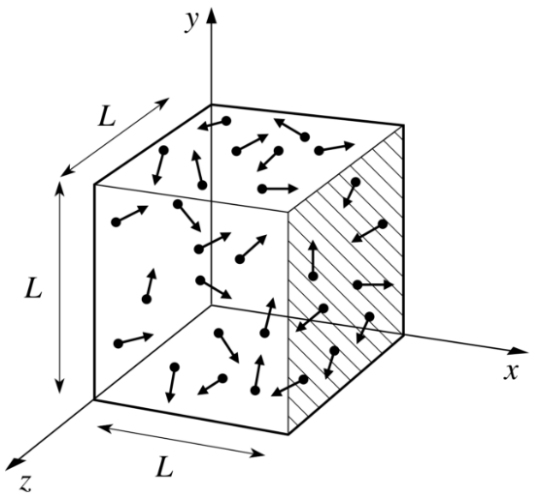


Deduce an equation of the work-energy principle for the given situation.

Q.14. (Total 5 Marks)

EITHER

a. The given figure shows a cube of length (L).



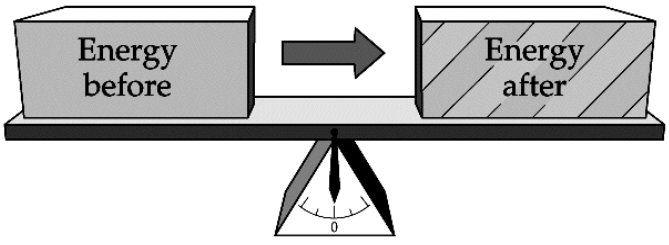
The pressure exerted by the gas molecules in one dimension inside this cube is equal to $P_x = \frac{m}{V} N v_x^2$, where ($P_x$) is the pressure in one dimension, (m) is the mass of the gas, (N) is the total number of molecules, (v_x^2) is the average square speed of the molecules in one dimension.

Deduce an equation for the total pressure exerted by the gas molecules inside the cube. (5 Marks)

OR

b.

i. Interpret the given diagram in light of the first law of thermodynamics. Provide a mathematical equation to support your interpretation. (3 Marks)



ii. Deduce an equation for the first law of thermodynamics in the isothermal process. (2 Marks)

END OF PAPER

Please use this page for rough work