

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

MODEL EXAMINATION PAPER 2018

Physics Paper I

Time: 50 minutes Marks: 35

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 35 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.

Correct Way		Incorrect Ways	
1	(A) (B) ● (D)	1	(A) (B) (C) (D)
		2	(A) (B) (C) (D)
		3	(A) (B) (C) (D)
		4	(A) (B) (C) (D)

Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a scientific calculator if you wish.

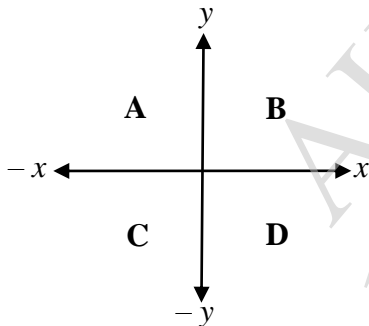
1. The length of a metallic rod is recorded as 8.50×10^5 m.

The numbers of significant figures in the given measurement are

- A. three.
 B. four.
 C. five.
 D. six.
2. Which of the following shows the CORRECT dimensions of velocity, force and momentum?

	Velocity	Force	Momentum
A	LT^{-1}	MLT^{-2}	MLT^{-1}
B	MLT^{-2}	LT^{-1}	LT^2
C	LT^{-1}	LT^{-1}	MLT^{-2}
D	MLT^{-2}	MLT^2	LT

3. R_x and R_y are components of a vector R . If R_x is positive and R_y is negative, then the quadrant in which vector R lies is



4. If the magnitude of a force is 10 N, then the magnitude of its rectangular components will be

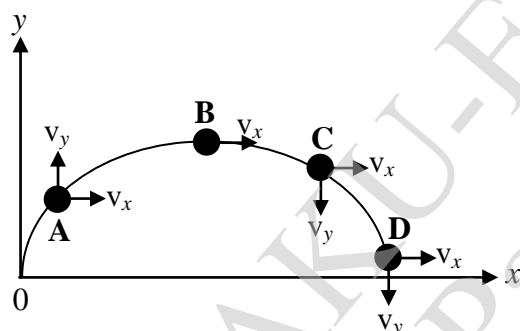
- A. 2 N and 8 N.
 B. 4 N and 7 N.
 C. 5 N and 5 N.
 D. 6 N and 8 N.
5. The vector product of two unit vectors \hat{j} and \hat{i} , which are perpendicular to each other, is

- A. 0
 B. 1
 C. $-\hat{k}$
 D. \hat{k}

6. Torque is applied in all of the following cases EXCEPT
- tightening of a screw.
 - rotating the key of a toy.
 - turning a pencil in a sharpener.
 - dragging a body on a level road.
7. A body is said to be in equilibrium if the vector sum of all the torques acting on it becomes
- zero.
 - unity.
 - two times.
 - three times.

8. The given diagram shows the projectile motion of a ball.

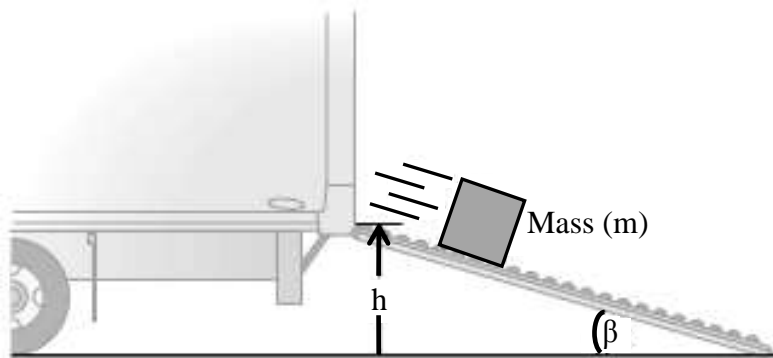
The magnitude of the vertical component of velocity (v_y) will be maximum at point



9. The horizontal range of a projectile is maximum at an angle of
- 0°
 - 30°
 - 45°
 - 60°
10. The projectile motion is a good example of
- one-dimensional motion.
 - two-dimensional motion.
 - three-dimensional motion.
 - four-dimensional motion.
11. If a projectile is fired with the initial velocity of 90 m/s to hit a ground level target, then its maximum possible horizontal range will be
- (Note: The value of “g” is 9.8 m/s^2 and air resistance is negligible.)
- 1.1 m
 - 9.2 m
 - $8.3 \times 10^2 \text{ m}$
 - $8.8 \times 10^2 \text{ m}$

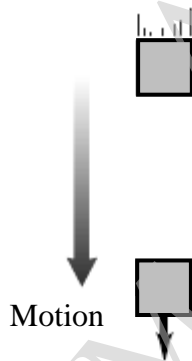
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12. A packet of mass (m) is unloaded from a truck by using an inclined plane of a height (h) as shown in the given figure.



If friction is negligible, then the kinetic energy of the packet when it reaches the ground will be equal to

- A. $\frac{1}{2} mgh$
 - B. mgh
 - C. $2mv^2$
 - D. mv^2
13. An object experiences a free fall motion as shown in the given figure.

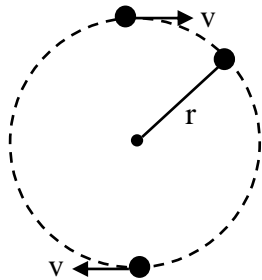


Which of the following is TRUE with respect to the work done W by the gravitational force and the object's gravitational potential energy U ?

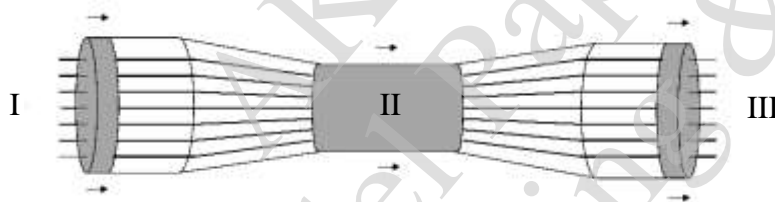
	W	U
A	Positive	Decreases
B	Negative	Decreases
C	Negative	Increases
D	Positive	Increases

14. The velocity which keeps a satellite in its orbit is known as
- A. escape velocity.
 - B. critical velocity.
 - C. angular velocity.
 - D. artificial velocity.

15. In the given diagram, an object is rotating with a speed which is increasing. The angular acceleration of the object is in the same direction as its

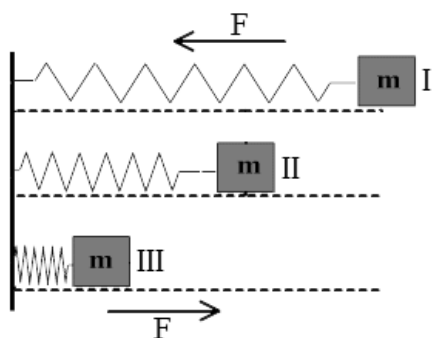


- A. angular velocity.
B. tangential velocity.
C. linear displacement.
D. radial displacement.
16. Which of the following is used to obtain a smooth motion?
A. Ripples
B. Upthrust
C. Turbulent
D. Streamline
17. At which cross sectional area(s) of the given pipe, the water flow is fastest?



- A. I only
B. II only
C. I and II
D. I and III
18. Which of the following is NOT obeyed by an ideal fluid?
A. Stoke's law
B. Torricelli's theorem
C. Bernoulli's equation
D. Equation of continuity

19. In the given mass-spring system, the potential energy of the block is zero at position(s)



- A. I only
B. II only
C. I and III
D. II and III
20. If a body is executing simple harmonic motion (SHM), then the total energy of the body is directly proportional to the
- A. amplitude.
B. square of the amplitude.
C. reciprocal of the amplitude.
D. square root of the amplitude.
21. Resonance is a phenomenon in which a vibrating system or external force drives another system to oscillate with greater amplitude at specific frequencies.
- This phenomenon helps in determining the
- A. forced vibration.
B. natural frequency.
C. energy dissipation.
D. amplitude of a vibrating body.
22. Which of the following factors affects the speed of sound in air?
- I. Density
II. Pressure
III. Temperature
- A. I only
B. II only
C. I and III
D. II and III

23. In the phenomenon of Doppler's effect, when a source of sound moves towards a stationary listener, it results in a decrease of the
- A. pitch of sound.
 - B. velocity of sound.
 - C. frequency of sound.
 - D. wavelength of sound.
24. All of the following phenomena are exhibited by longitudinal waves, EXCEPT
- A. refraction.
 - B. diffraction.
 - C. interference.
 - D. polarisation.
25. The resultant displacement at any point due to the sum of displacements of two or more waves is called
- A. interference.
 - B. Doppler's effect.
 - C. Huygen's principle.
 - D. principle of superposition.
26. The place where compressions of one wave combines with the rarefactions of another wave, and both cancel each other is called a
- A. null point.
 - B. dead beat.
 - C. node point.
 - D. zero point.
27. In the given diagram, the frequency of waves will be
- A. equal in all cases.
 - B. the greatest in one loop.
 - C. the greatest in two loops.
 - D. the greatest in three loops.
- The diagram shows three standing waves on a stretched string between two fixed points. The top wave has one loop (antinode), the middle wave has two loops, and the bottom wave has three loops. The label 'Waves' is above the diagram.
- Stretched String Vibration
28. According to Huygen's principle, light travels in the form of
- I. photons
 - II. corpuscles
 - III. wavefronts
- A. I only.
 - B. III only.
 - C. I and II.
 - D. II and III.

29. When a visible light ray passes through a small opening of a narrow slit, the longer wavelength, as compared to shorter wavelength of the light ray will
- A. reflect less.
 - B. diffract less.
 - C. reflect more.
 - D. diffract more.
30. According to Boyle's law, pressure is inversely proportional to volume of a gas at constant
- I. mass
 - II. density
 - III. temperature
- A. I only.
 - B. III only.
 - C. I and II.
 - D. II and III.
31. A thermodynamics process in which an ice cube starts melting and converts into water droplets while keeping the temperature of its surrounding constant is called an
- A. isobaric process.
 - B. isochoric process.
 - C. adiabatic process.
 - D. isothermal process.
32. According to the 2nd law of thermodynamics, heat can be converted into mechanical work if the system contains
- A. two heat reservoirs at the same temperature.
 - B. two heat reservoirs at different temperatures.
 - C. an engine and a heat reservoir at the same temperature.
 - D. an engine and two heat reservoirs at different temperatures.
33. A Carnot heat engine is an engine that operates on the reversible Carnot cycle.
- Its efficiency depends upon the temperature of
- A. the surrounding.
 - B. the hot reservoir only.
 - C. the cold reservoir only.
 - D. both hot and cold reservoirs.
34. In an irreversible process of a thermodynamics system, there is
- A. a loss of heat.
 - B. a decrease in volume.
 - C. an increase in pressure.
 - D. no change in temperature.

35. If a gas is heated in a closed system, then the quantity which remains unchanged would be the
- A. mass.
 - B. volume.
 - C. pressure.
 - D. temperature.

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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.

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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.

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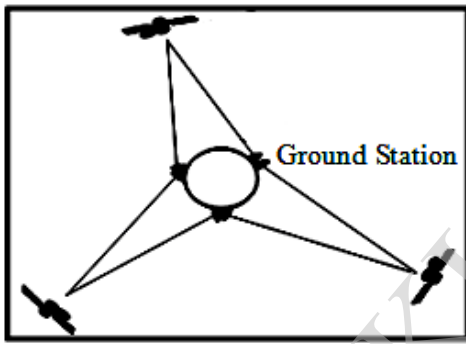
Q.4. (Total 4 Marks)

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)



-
-
-
-

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)

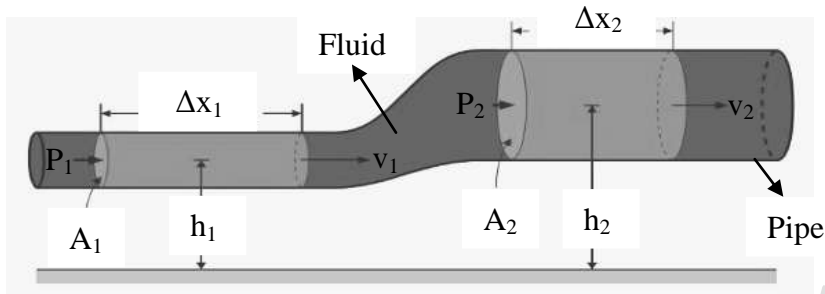
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Q.6.

(Total 3 Marks)

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

(1 Mark)



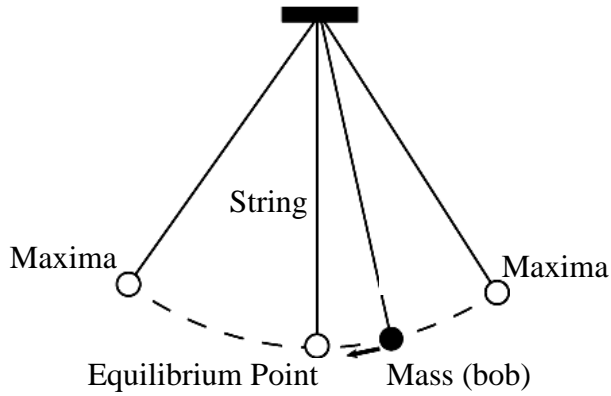
b. To understand the features of fluids in motion, the behaviour of fluids should satisfy three conditions. State any TWO of these conditions.

(2 Marks)

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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**.

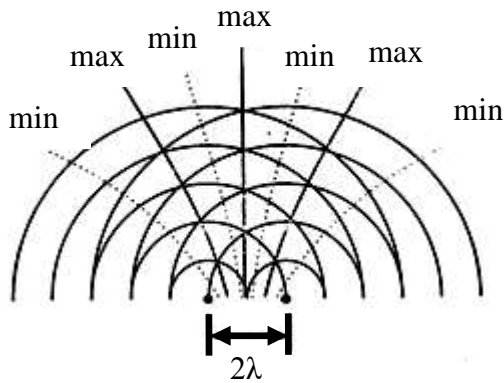
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Q.11.

(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)

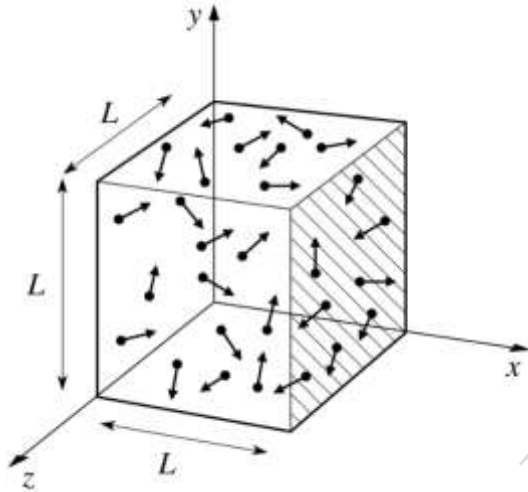
A Carnot heat engine with an efficiency of 65% absorbs heat from a reservoir at 590 K. Calculate the exhaust temperature of the engine.

Q.14.

(Total 5 Marks)

EITHER

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



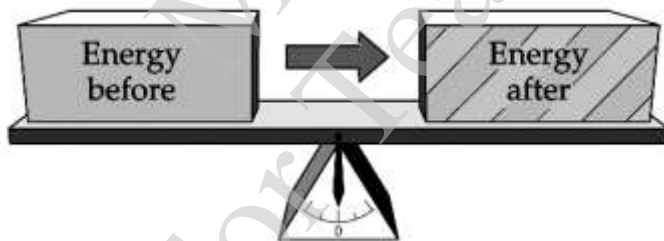
The pressure exerted by the gas molecules in one dimension inside this cube is equal to $P_x = \frac{m}{V} N v_x^2$, where (P_x) is the pressure in one dimension, (m) is the mass of the gas, (N) is the total number of molecules, (v_x^2) is the average square speed of the molecules in one dimension.

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)

Please use this page for rough work

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