

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

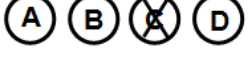
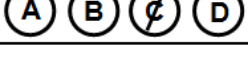
ANNUAL EXAMINATIONS (THEORY) 2024

Physics Paper I

Time: 1 hour 30 minutes Marks: 50

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 50 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		1	
		2	
		3	
		4	

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. Which of the following shows the dimensions of force and acceleration respectively?

- A. MLT^{-2} and LT^{-2}
- B. $ML^2 T$ and LT^{-2}
- C. MLT^{-2} and LT^2
- D. MLT^{-2} and LT

2. The length of a strip is measured by a metre scale as 3.4 cm.

The reading measured on the Vernier callipers for the length of the strip will be

- A. 0.34 cm.
- B. 3.4 cm.
- C. 3.40 cm.
- D. 3.400 cm.

3. Random errors can be reduced by

- I. taking zero correction
- II. taking mean of several measurements
- III. comparing the instrument with a more accurate one

- A. II only.
- B. III only.
- C. I and II.
- D. I and III.

4. The number of significant figures in the sum of 1.21×10^5 and 3.26×10^3 is

- A. 3
- B. 5
- C. 6
- D. 8

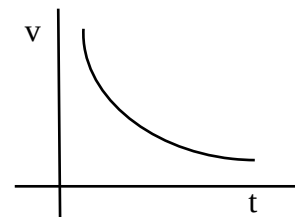
5. The scalar product of two perpendicular vectors is

- A. -1
- B. 0
- C. 1
- D. 2

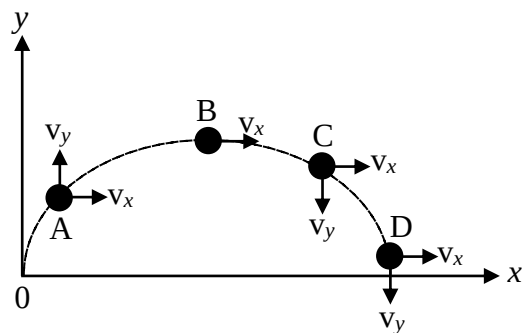
6. The non-commutative property of a vector product is

- A. $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$
- B. $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$
- C. $\vec{A} \cdot \vec{B} = -\vec{B} \cdot \vec{A}$
- D. $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$

7. The cross product of two vectors, force and moment arm, is
- A. torque.
 - B. energy.
 - C. velocity.
 - D. workdone.
8. If the value of moment arm is zero, then the value of torque will be
- A. $1 > \tau > 0$
 - B. $\tau < 0$
 - C. $\tau = 0$
 - D. $\tau = 1$
9. A body is in equilibrium if the net force on it is
- A. -1 N .
 - B. 0 N .
 - C. $\frac{1}{2} \text{ N}$.
 - D. 1 N .
10. An elastic collision takes place when an initial body collides with a targeted body of the same mass which is at rest.
- In the given situation, the velocity of the initial body after the collision will
- A. be zero.
 - B. be halved.
 - C. be doubled.
 - D. remain constant.
11. If a projectile is fired with the velocity of 10 m/s at an angle of 30° , then the maximum height attained by the projectile is
- (Note: The value of acceleration due to gravity is 9.8 m/s^2 .)
- A. 0.510 m .
 - B. 1.275 m .
 - C. 2.551 m .
 - D. 5.102 m .
12. The slope of the curve in the given velocity-time graph represents
- A. uniform velocity.
 - B. positive acceleration.
 - C. negative acceleration.
 - D. instantaneous velocity.



13. 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



14. If a motorcyclist wears a safety helmet during his ride and meets an accident, then the safety helmet will

- A. decrease the time of collision and increase the impulse.
- B. increase the time of collision and decrease the impulse.
- C. increase the momentum of motorcyclist and decrease the acting force.
- D. decrease the momentum of motorcyclist and increase the acting force.

15. Which of the following options exemplify(ies) negative work done?

- I. Work done under a conservative force
- II. Work done against the force of friction
- III. Work done under the influence of gravity

- A. I only
- B. II only
- C. I and II
- D. II and III

16. A group of migrating birds are flying in the sky. If they experience wind in the same direction of their motion, then the work done by the wind on birds will be

- A. zero.
- B. infinite.
- C. positive.
- D. negative.

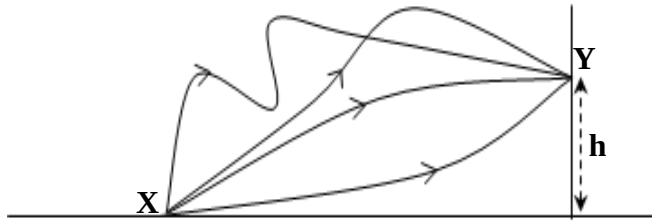
17. The given diagram depicts a boy lifting a box.

In this situation, the type of workdone and the associated angle will be

	Type of work done	Angle
A	negative	0°
B	positive	0°
C	negative	180°
D	positive	180°

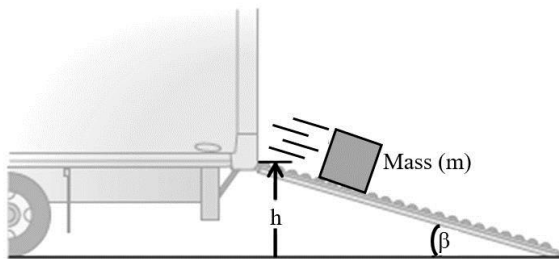


18. A body is moved from position **X** to **Y** along four different paths as shown in the given figure.



The work done in moving the object in the gravitational field will

- A. vary at different paths.
 - B. be greater for the longer path.
 - C. be same and equal to its kinetic energy.
 - D. be same and equal to its potential energy.
19. A packet of mass (m) is unloaded from a truck by using inclined plane from a height (h) as shown in the given figure.



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

- A. $\frac{1}{2} mgh$.
 - B. mv^2 .
 - C. mgh .
 - D. $2 mv^2$.
20. An elevator lifts a weight of 400 N through a height of 10 m in 20 s. The power of the motor is
- A. 200 W.
 - B. 800 W.
 - C. 4000 W.
 - D. 8000 W.
21. In an artificial satellite, an object appears to be weightless when its rotational acceleration ' α ' is equal to
- A. $g / 4$.
 - B. $g / 2$.
 - C. g .
 - D. $2 g$.

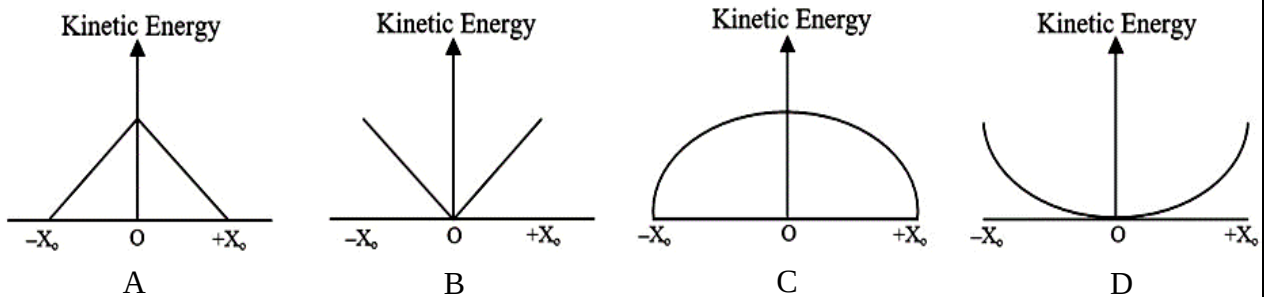
22. If an artificial satellite is orbiting around the Earth at an altitude of 240 km above the Earth's surface, then the orbital velocity of the satellite will be

(**Note:** Take the mass of the Earth as 6.0×10^{24} kg, its radius as 6400 km and Gravitational constant as 6.67×10^{-11} Nm /kg.)

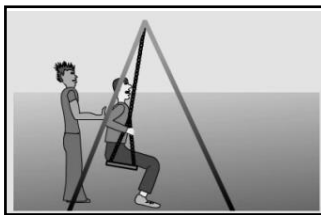
- A. 2.455×10^4 m/s.
 - B. 6.027×10^7 m/s.
 - C. 7.763×10^3 m/s.
 - D. 7.907×10^3 m/s.
23. In a rotating space-ship, if the angular displacement is constant, then the linear displacement of an astronaut, when s/ he moves away from the centre of rotation will
- A. increase.
 - B. decrease.
 - C. become zero.
 - D. remain constant.
24. When an object moves with uniform speed in a circular orbit, its centripetal acceleration will be directed
- A. along the circumference of the circle.
 - B. along the direction of motion of the object.
 - C. towards the centre of the circle along the radius.
 - D. away from the centre of the circle along the radius.
25. If an artificial satellite slows down its orbital motion, then it will
- A. fall onto the Earth.
 - B. move away from the Earth.
 - C. stop revolving around the Earth.
 - D. continue revolving around the Earth.
26. Which of the following effects is observed in a Venturi metre, when liquid flows through the narrow section of the pipe?
- A. Pressure is reduced
 - B. Pressure is increased
 - C. Viscosity is increased
 - D. Viscosity is decreased
27. The object that easily attains the terminal velocity is a
- A. rain drop.
 - B. cricket ball.
 - C. falling apple from a tree.
 - D. falling stone from some height.

28. The drag force on an object when it is moving in a fluid is 'F'. If the velocity of the object becomes double, then the value of force will become
- A. $F / 4$.
 - B. $F / 2$.
 - C. F .
 - D. $2 F$.
29. In a cement factory, a viscous liquid flows through a pipe with an area of cross-section 6 m^2 at a velocity of 8 m/s .
- When this fluid moves forward, the area of cross-section of the pipe decreases to 4 m^2 . The velocity of the liquid will now be
- A. 3 m/s .
 - B. 12 m/s .
 - C. 18 m/s .
 - D. 24 m/s .
30. A rocket is made to travel at a high speed by making the ejection nozzle narrow.
- This phenomenon is based on
- A. turbulent flow.
 - B. terminal velocity.
 - C. Torricelli's theorem.
 - D. equation of continuity.
31. If a simple pendulum is taken from the peak of Nanga Parbat Mountain to Karachi, then its time period will
- A. increase.
 - B. decrease.
 - C. become zero.
 - D. remain the same.
32. If the mass of bob attached to a simple pendulum is increased by eight times, then the time period of the pendulum will
- A. become zero.
 - B. remain the same.
 - C. decrease four times.
 - D. increase eight times.

33. Which of the following graphs indicates the variation in kinetic energy of a particle executing simple harmonic motion?

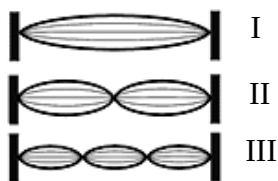


34. The given diagram shows an example of an oscillator that is displaced to produce vibrations.



If a force is repeatedly applied on the oscillator, then it will produce

- A. beats.
 - B. resonance.
 - C. free oscillations.
 - D. forced oscillations.
35. In the given diagram, the frequency of waves is



Stretched String Vibration

- A. equal in all cases.
 - B. greatest in case I.
 - C. greatest in case II.
 - D. greatest in case III.
36. When the source of sound moves away from a stationary listener, there is an apparent
- A. increase in the pitch of sound.
 - B. increase in the amplitude of sound.
 - C. decrease in the frequency of sound.
 - D. decrease in the wavelength of sound.

37. The phenomenon of beats is the result of

- I. diffraction
- II. polarisation
- III. interference

- A. I only.
- B. III only.
- C. I and II.
- D. II and III.

38. A cylindrical resonance tube, opened at both ends, has a fundamental frequency 'f' in the air as shown in **figure I**.

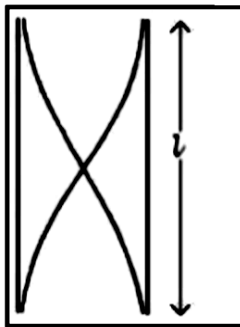


Figure I

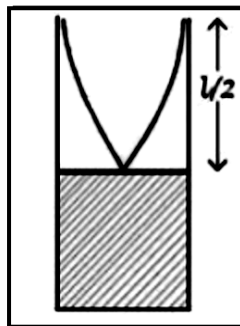


Figure II

As shown in **figure II**, if half of the length of the resonance tube is dipped vertically into water, then the fundamental frequency in the air will be

- A. $f / 2$.
- B. f .
- C. $2 f$.
- D. $4 f$.

39. The speed of sound wave in a medium depends upon

- I. mass of the medium
- II. density of the medium
- III. elasticity of the medium

- A. I only.
- B. III only.
- C. I and II.
- D. II and III.

40. All of the following phenomena are exhibited by longitudinal waves EXCEPT

- A. refraction.
- B. diffraction.
- C. interference.
- D. polarisation.

41. While performing Young's double slit experiment, the given changes were made.

Distance between Slits	Distance between Slits and Screen
Doubled	Halved

If the initial fringe spacing was ' x ', then the fringe spacing after the changes will be

- A. $4x$.
 B. $2x$.
 C. $x/2$.
 D. $x/4$.
42. In a Newton's ring setup, the MAIN factor responsible for the formation of the rings is
- A. reflection of light.
 B. refraction of light.
 C. diffraction of light.
 D. interference of light.
43. 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.
44. Colours reflected from an oil film on water depend on all of the following factors EXCEPT
- A. density of oil.
 B. angle of view.
 C. index of refraction.
 D. thickness of the film.
45. The rise in thermal pollution in an environment suggests that entropy has
- A. increased.
 B. decreased.
 C. become zero.
 D. remained constant.
46. If a gas in a container absorbs 200 J of heat and has 150 J of work done on it, then the internal energy of the gas will be
- A. increased by 50 J.
 B. decreased by 50 J.
 C. increased by 350 J.
 D. decreased by 350 J.

47. Assume that a heat engine attains 100% efficiency.

This assumption is made possible only if the output temperature is

- A. equal to 0 K.
 - B. less than 0 K.
 - C. equal to its input temperature.
 - D. less than its input temperature.
48. A turbine in a thermal power plant takes steam from a boiler at 646 K and exhausts into a low temperature reservoir at 546 K.
- The efficiency of the turbine is
- A. 8.4%.
 - B. 15.3%.
 - C. 18.3%.
 - D. 84.5%.
49. The direction of heat flow from one object to another is based on the difference in their
- A. density.
 - B. temperature.
 - C. specific heat.
 - D. thermal conductivity.
50. When an ideal gas is cooled at a constant volume till the pressure reduces to half of the original pressure, the average translational kinetic energy of the gas molecules will
- A. remain unchanged.
 - B. become half of the original.
 - C. become two times of the original.
 - D. become three times of the original.

Please use this page for rough work

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