AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

ANNUAL EXAMINATIONS (THEORY) 2023

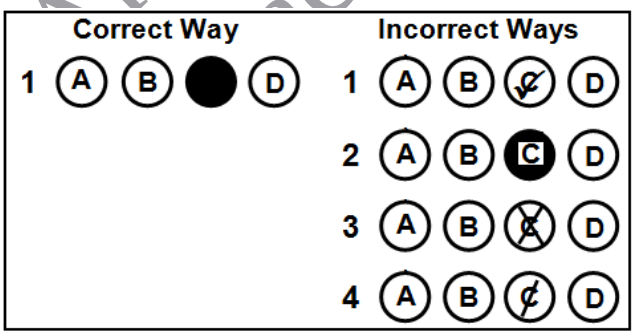
Physics Paper I

Time: 1 hour 30 minutes Marks: 50

AKU-EB Annual Examination 2023 for Teaching and Learning only

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.



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. A systematic error can be removed by

   A. taking mean reading.
   B. repeating the reading.
   C. changing the surrounding.
   D. recalibrating the instrument.

2. The least count of a metre scale is

   A. 0.001 cm.
   B. 0.1 mm.
   C. 1 mm.
   D. 1 cm.

3. The option that shows three base quantities' units in System International (S.I.) is

   A. gram, joule and second.
   B. gram, centimetre and dyne.
   C. kilogram, metre and second.
   D. kilogram, newton and second.

4. The second equation of motion of a uniformly accelerated ball along a straight line is stated as

   $S = v_i t + \frac{1}{2} at^2$

   The dimension of each term of this equation is

   A. $[L^{-1}]$
   B. $[T^{-1}]$
   C. [L]
   D. [T]

5. The given figure satisfies one of the conditions of equilibrium.

Which of the following options identifies the CORRECT name and statement of the condition?

	Name of Condition	Statement
A	First	Vector sum of all the torques is zero
B	Second	Vector sum of all the forces is zero
C	First	Vector sum of all the momenta is zero
D	Second	Vector sum of all the torques is zero

AKU-EB Annual Examination 2023 for Teaching and Learning only

6. The cross product of unit vectors $(\hat{i} \times \hat{i} = \hat{j} \times \hat{j} = \hat{k} \times \hat{k})$ is equal to

   A. –1
   B. 0
   C. 1
   D. $\sqrt{1}$

7. If the scalar product of two unit vectors is one $(\hat{i} \cdot \hat{i} = 1)$, then both vectors will be

   A. parallel vectors.
   B. in any direction.
   C. antiparallel vectors.
   D. perpendicular to each other.

8. If the direction of an applied force $\vec{F}$ is reversed, then

	Magnitude of the Torque	**Direction of the Torque**
A	remains the same.	remains the same.
B	remains the same.	reverses.
C	increases.	remains the same.
D	decreases.	reverses.

9. If the components $\vec{A}_x$ and $\vec{A}_y$ of vector $\vec{A}$ are negative and positive respectively, then vector $\vec{A}$ lies in

   A. I quadrant.
   B. II quadrant.
   C. III quadrant.
   D. IV quadrant.

10. When a lighter metallic ball collides with a heavier metallic ball that is at rest position, then after collision the heavier ball will

    A. remain at rest.
    B. gain the lighter ball's velocity.
    C. move in the opposite direction.
    D. move with double the velocity of the lighter ball.

11. A bullet is fired from a short gun to shoot a bag of sand. It hits the bag and goes through it.

    In the given situation, when the bullet hits the bag of sand, the total momentum of the bullet

    A. increases.
    B. decreases.
    C. becomes zero.
    D. remains the same.

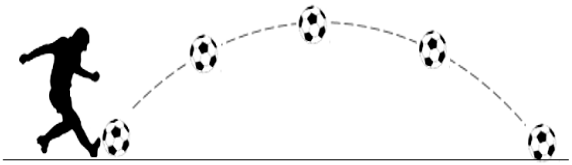
AKU-EB 2023 for Annual Examination Teaching and Learning only

12. If the slope of a velocity-time graph gradually increases, then the body is said to be moving with

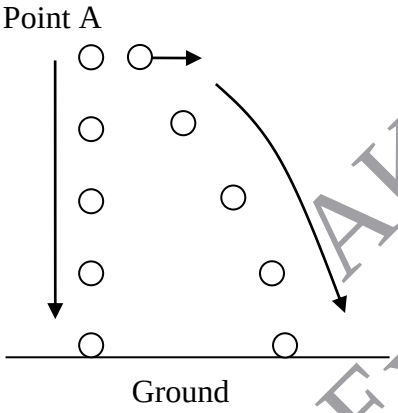
    A. uniform velocity.
    B. positive acceleration.
    C. negative acceleration.
    D. instantaneous velocity.

13. A football kicked by a football player in the air is an example of

    A. linear motion.
    B. circular motion.
    C. projectile motion.
    D. rotational motion.



14. Two balls are released simultaneously from a point 'A' with zero vertical velocity as shown in the given diagram.



These balls followed different paths but reached the ground at the same time due to the

    A. same size of balls.
    B. horizontal velocity.
    C. same vertical height.
    D. horizontal acceleration.

15. Suppose that the mass and radius of the Moon changes to 7.35×10^{22} kg and 1.7×10^{6} m respectively. The escape velocity of the Moon will then be

    (**Note**: The value of Gravitational constant is 6.63×10^{-11} Nm^2/kg^2.)

    A. 1.0×10^{3} m/s.
    B. 1.1×10^{6} m/s.
    C. 2.4×10^{3} m/s.
    D. 8.2×10^{6} m/s.

Annual Examination 20 AKU-EB
Teaching and Learning only

16. If a machine does 50 J of work in 10 s, then the power of the machine will be

A. 5 W.
B. 40 W.
C. 60 W.
D. 500 W.

17. In marathon race, a runner, while moving, is facing a wind from the opposite direction. The work done by the wind on the runner will be

A. zero.
B. infinity.
C. positive.
D. negative.

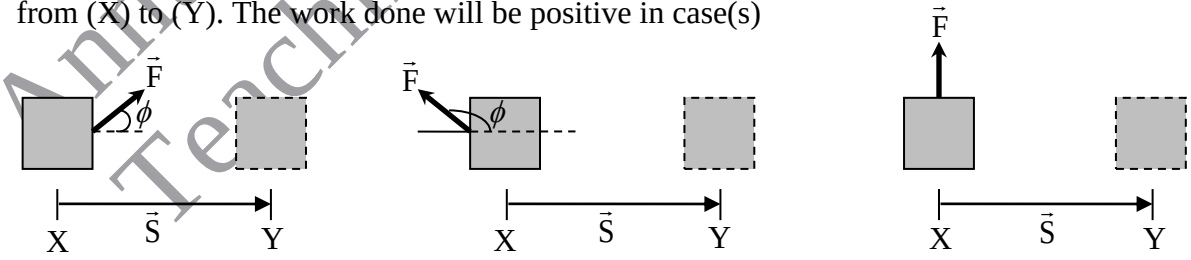
18. Work done by gravitational field is independent of the

A. mass of the object.
B. weight of the object.
C. paths taken by the object.
D. change in height of the object.

19. Which of the following options correctly depicts the examples of kinetic and potential energy?

	Kinetic Energy	Potential Energy
A	A weight placed at a height	A moving car
B	A bullet fired from a gun	Water stored by a dam
C	A yoyo before it is released	A person walking and running
D	A book on a table before it falls	Meteors falling from the space

20. In the given figures, three cases are shown in which a constant force is trying to move an object from (X) to (Y). The work done will be positive in case(s)



(I) (II) (III)

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

Annual Exam 2023 for BISE KU-EB Teaching and Learning only

21. For the purpose of oceanography and meteorology, Pakistan has launched a Remote Sensing Satellite System (RSSS) at an altitude of 7×10^5 m above the ground station.

    At the time of launch, the orbital velocity of the artificial satellite was calculated as

    (**Note**: The value of gravitational constant, mass and radius of Earth are 6.67×10^{-11} Nm^2/kg^2, 5.9×10^{24} kg and 6.3×10^6 m respectively.)

    A. 5.6×10^7 m/s.
    B. 6.2×10^7 m/s.
    C. 6.8×10^3 m/s.
    D. 7.4×10^3 m/s.

22. Astronauts in an orbiting artificial satellite, riders of a free-falling ride in an amusement park and people inside a free-falling elevator are three examples of weightlessness. This is experienced due to the

    I. force of gravity acting upon their bodies
    II. absence of external contact force acting upon their bodies
    III. gravitational pull of the Sun and other planets upon their bodies

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

23. If an object has the moment of inertia of 1 kgm^2 and it rotates with a constant angular velocity of 2 rad/s, then the rotational kinetic energy of the object will be

    A. 0.5 J.
    B. 2 J.
    C. 4 J.
    D. 8 J.

24. One complete cycle of geo-stationary satellite orbit around the earth takes approximately

    A. 1 hour.
    B. 24 hours.
    C. 120 hours.
    D. 365 hours.

25. A stone is whirled in a vertical circle at the end of an inelastic string. When the stone is at the highest position, the tension in the string will be

    A. minimum.
    B. maximum.
    C. less than the mass of the stone.
    D. equal to the weight of the stone.

AKU-EB Annual Examination 2023 for Teaching and Learning only

26. The equation of continuity of a fluid is related to the conservation of

A. mass.
B. energy.
C. momentum.
D. angular momentum.

27. 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.

28. All of the following are the factors on which terminal velocity of a falling object depends EXCEPT

A. mass of the object.
B. velocity of the object.
C. cross-sectional area of the object.
D. gravitational acceleration of the object.

29. If a water droplet falls from a height in air, its terminal velocity will be attained when the drag force is

A. twice the weight of droplet.
B. thrice the weight of droplet.
C. half of the weight of droplet.
D. equal to the weight of droplet.

30. Bernoulli's equation is the fundamental equation in fluid dynamics that relates pressure of fluid to its speed and height.

According to the Bernoulli's equation, when the speed of the fluid is high, then the pressure will be

A. low.
B. zero.
C. high.
D. constant.

AKU-EB Annual Examination 2023 for Teaching and Learning only

31. A mass ‘m’ is hanging on an inextensible string to make a simple pendulum of time period ‘T’. If the mass becomes ‘3 m’, then the time period of the simple pendulum will be

A. $\frac{T}{3}$.
B. T.
C. 3T.
D. $\sqrt{3}\,T$.

32. If x is the displacement of a bob of a simple pendulum from the mean position, then $kx^2/2$ will be equal to its

I. total energy
II. kinetic energy
III. potential energy

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

33. A particle is moving in a circle with uniform speed, for which the projection of the particle is moving along the diametre of the circle.

In the given situation, the motion of projection is

A. linear.
B. rotatory.
C. circulatory.
D. simple harmonic.

34. In desert Safari, drivers use best quality of shock absorbers in their cars to create

I. free oscillation
II. forced oscillation
III. damped oscillation

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

35. In Doppler’s effect, when a source of sound moves away from a stationary listener then the apparent frequency

A. increases.
B. decreases.
C. becomes zero.
D. remains unchanged.

AKU-EB Annual Examination 2023 for Teaching and Learning only

36. While travelling by a boat, we hear the siren of a nearby ship at certain points but not at some other points. This phenomenon is caused by

A. formation of beats.
B. destructive interference.
C. production of resonance.
D. constructive interference.

37. Two prongs of a tuning fork are hit on a rubber pad to produce certain frequency.

If the two prongs are coated with a thick layer of wax, then after hitting it on a rubber pad, its frequency will

A. increase.
B. decrease.
C. become zero.
D. remain unchanged.

38. When a stationary wave is setup in an air column which is closed from one end, a node is formed

A. outside the pipe.
B. at the closed end of the pipe.
C. at the opened end of the pipe.
D. near the middle point of the pipe.

39. Sound waves are good example of

A. matter waves.
B. transverse waves.
C. longitudinal waves.
D. electromagnetic waves.

40. If 20 sound waves pass through a point in a medium in 2 s with the velocity of 20 m/s, then the wavelength will be

A. 1 m.
B. 2 m.
C. 10 m.
D. 20 m.

41. In Young's double slits experiment, the relation used to find the position of the dark fringes is

(**Note**: All the symbols have their usual meaning.)

A. $Y = (m + 1) \lambda L / d$
B. $Y = (m - 1) \lambda L / d$
C. $Y = (m + 1/2) \lambda L / d$
D. $Y = (m - 1/2) \lambda d / L$

AKU-EB Annual Examination 2023 for Teaching and Learning only

42. All of the following are different applications of polarised sunglasses in our daily life EXCEPT to

A. spot fishes in the water.
B. protect eyes from ultraviolet rays.
C. reduce the glare of headlights of cars.
D. locate atoms on the surface of a heated filament.

43. Michelson's interferometre is used to measure

I. velocity of light
II. frequency of light
III. wavelength of light

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

44. Soap films are thin layers of liquid usually water-based surrounded by air. In the sunlight, colours are visible on the surface of them due to

A. scattering of light.
B. dispersion of light.
C. diffraction of light.
D. interference of light.

45. In which of the following thermodynamics process, the temperature of a system decreases?

A. Adiabatic expansion
B. Isothermal expansion
C. Adiabatic compression
D. Isothermal compression

46. All of the following quantities describe the state of a gas EXCEPT

A. volume.
B. pressure.
C. temperature.
D. specific heat.

47. If the volume of a gas is reduced to half of its original volume, then the specific heat of the gas will

A. be halved.
B. be doubled.
C. remain constant.
D. vary unpredictably.

AKU-EB Annual Examination 2023 for Teaching and Learning only

48. In thermodynamics, the internal energy is a state function, which is

	Dependent on	Independent of
A	initial and final states.	path.
B	initial and final states.	work done.
C	initial and final pressure.	path.
D	initial and final pressure.	work done.

49. In thermodynamics, a closed system is the one in which mass and energy from the boundaries of a system

	Mass	Energy
A	can transfer to the surrounding.	can transfer to the surrounding.
B	cannot transfer to the surrounding.	cannot transfer to the surrounding.
C	can transfer to the surrounding.	cannot transfer to the surrounding.
D	cannot transfer to the surrounding.	can transfer to the surrounding.

50. If the temperature of the source of heat decreases while the temperature of the sink remains constant, then the efficiency of a Carnot engine

A. increases.
B. decreases.
C. remains the same.
D. varies unpredictably.

AKU-EB Annual Examination 2023 for Teaching and Learning only

END OF PAPER

Please use this page for rough work

AKU-EB
Annual Examination 2023 for
Teaching and Learning only