AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

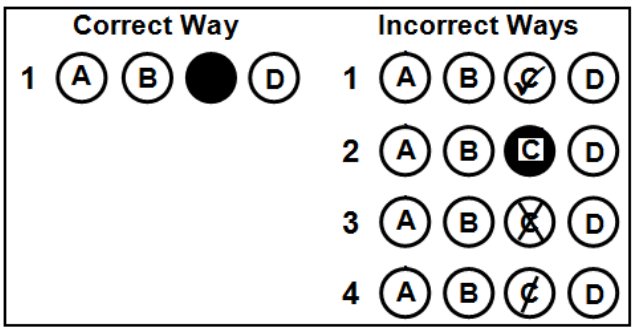
MODEL EXAMINATION PAPER 2023 AND ONWARDS

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.



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 dimensions of momentum are represented as

   A. $[ML^2T^{-1}]$.
   B. $[MLT^{-1}]$.
   C. $[MLT^{-2}]$.
   D. $[ML^{-1}T]$.

2. Uncertainty in measurement can occur due to the

   I. limitation of instruments
   II. natural variations
   III. frequent errors

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

3. Random errors can be reduced by

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

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

4. The CORRECT scientific notation for 100.00 is

   A. 1.00×10^{-3}
   B. 1.00×10^{-2}
   C. 1.00×10^{2}
   D. 1.00×10^{3}

5. If the dot product of two vectors (**X** and **Y**) is zero, then which of the following conditions is TRUE?

   A. Both vectors are opposite in direction
   B. Both vectors are parallel to each other
   C. Either of the two vectors is a unit vector
   D. Either of the two vectors is a null vector

6. The cross product of two vectors (**X** and **Y**) is a negative vector when the angle between them is

   A. 0^o
   B. 90^o
   C. 180^o
   D. 270^o

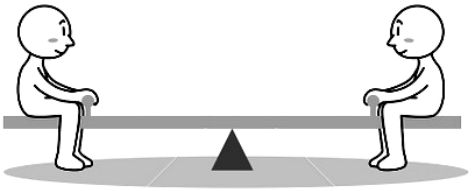
7. If the length of the moment arm is zero, then the value of torque will be

   A. $1 > \tau > 0$
   B. $\tau < 0$
   C. $\tau = 0$
   D. $\tau = 1$

8. If the magnitude of a vector **Y** is the same as that of vector **X** but opposite in direction, then vector **Y** is equal to

   A. 1
   B. 0
   C. **X**
   D. **– X**

9. The given figure depicts 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

10. A lighter metallic ball (m_1) collides with a much heavier metallic ball (m_2) which is at rest, and ($m_1 << m_2$), then after collision, the momentum of the heavier ball (m_2) 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. The given figure shows the first attempt of a long jump of an athlete in Olympics.

Which of the following factors of the athlete will MAINLY help him to improve his own record in the next attempt?

A. Angle of projection of the athlete
B. Acceleration of the athlete
C. Body shape of the athlete
D. Weight of the athlete

12. Missiles **I**, **II**, **III** and **IV** are launched at 35º, 45º, 55º and 65º, respectively from the launching pad with same initial velocity.

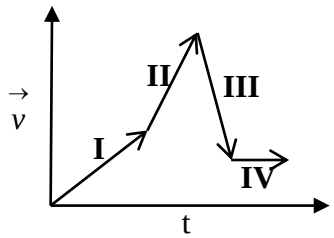
The shortest distance will be covered by

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

13. A two dimensional motion under the action of acceleration due to gravity is known as

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

14. In the given velocity-time graph, the body is said to have



A. zero acceleration in region I.
B. variable acceleration in region II.
C. positive acceleration in region IV.
D. negative acceleration in region III.

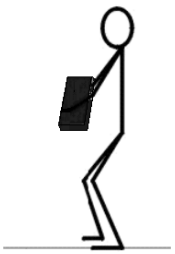
15. The work done by the gravitational force on a body in displacing it from a position, near the surface of the Earth to infinity is called the,

    I. elastic potential energy
    II. potential energy of the body
    III. absolute potential energy of the body

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

16. The given diagram represents a boy lifting a block in the upward direction.

    The work done by the gravitational force on the block is



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

17. If a crane lifts a weight of 500 N to a height of 50 m in 5 seconds, then the average power of the crane will be

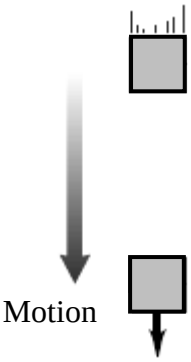
    (**Note**: Take the value of acceleration due to gravity as 10 m/s^2.)

    A. 2 W.
    B. 50 W.
    C. 500 W.
    D. 5000 W.

18. One of the advantages of using renewable energy sources is

    A. their low initial cost.
    B. their low storage cost.
    C. that they require less maintenance.
    D. that they increase energy resources.

19. 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

20. The initial velocity of an object with which it gets rid of the Earth's gravitational field is called

A. drag velocity.
B. escape velocity.
C. angular velocity.
D. terminal velocity.

21. 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.

22. In all of the following sports, the law of conservation of angular momentum is used EXCEPT in

A. ice-skating.
B. gymnastics.
C. horse riding.
D. board diving.

23. The acceleration produced by virtue of changing direction of velocity of an object moving in a circular path is called

    A. average acceleration.
    B. tangential acceleration.
    C. centripetal acceleration.
    D. instantaneous acceleration.

24. If the mud flies off from the tyres of a moving bicycle, then its direction will be

    A. tangent to the tyre.
    B. along the moving bicycle.
    C. towards the centre of the tyre.
    D. away from the tyre in a circular path.

25. The direction of the angular acceleration of a body is always

    I. along the axis of rotation
    II. along the tangent to the path
    III. perpendicular to the axis of rotation

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

26. All of the following are applications of Bernoulli's effect EXCEPT

    A. aerofoil.
    B. atomizer.
    C. venturi meter.
    D. vacuum cleaner.

27. If each particle of a fluid passing through a point follows the same path, then this flow is called

    A. ideal flow.
    B. normal flow.
    C. turbulent flow.
    D. streamline flow.

28. According to the equation of continuity, if the cross-sectional area of a pipe decreases, then the speed of the fluid passing through it

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

29. Which of the following statements is CORRECT in light of Bernoulli's theorem?

A. The speed of fluids is low at low pressure.
B. The speed of fluids is high at low pressure.
C. The pressure of a fluid is independent of its speed.
D. The theorem is valid only for turbulent flow of a liquid.

30. When an aeroplane is flying, the air moves from the top and the bottom of the wings. The air moving over the top of the wings is faster due to which the pressure above the wings will

A. be low.
B. be high.
C. be zero.
D. vary unpredictably.

31. Loud music produced by beating a wooden drum is an example of

A. beats.
B. free vibrations.
C. forced vibrations.
D. damped oscillations.

32. When a car moves on any uneven surface, then its shock absorbers play an important role.

The working of shock absorbers exemplifies

A. free oscillation.
B. force oscillation.
C. damped oscillation.
D. undamped oscillation.

33. When the bob of a simple pendulum is at the mean position during oscillation, its kinetic energy will

A. be zero.
B. be minimum.
C. be maximum.
D. remain constant.

34. All of the following are the examples of free oscillation EXCEPT

A. prongs of a tuning fork.
B. motion of a child on a swing.
C. notes of a musical instrument.
D. vibrating wire of a sonometer.

35. Which of the following statements about the speed of waves on a string is/ are TRUE?

I. Speed depends on the frequency.
II. Speed depends on the tension in the string.
III. Speed depends on the mass per unit length of the string.

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

36. If a wave has a frequency of 10 Hz, then the time period of the wave will be

A. 0.1 s.
B. 1 s.
C. 10 s.
D. 100 s.

37. When two tuning forks of nearly the same frequencies are sounded together, a note of alternately increasing and decreasing intensity will be heard.

Based on the given description, the note is called

A. beat.
B. waveform.
C. diffraction.
D. polarisation.

38. The option that shows the conditions used by Laplace for correcting the velocity of sound is

	Medium Used	**Thermodynamics Process**
A	solid	adiabatic
B	liquid	isobaric
C	gas	adiabatic
D	gas	isothermal

39. When a listener moves away from a stationary source of sound, then for the listener the apparent change in the pitch and frequency of sound for the listener is

	Pitch	**Frequency**
A	low	low
B	high	low
C	low	high
D	high	high

40. When a swimmer goes deeper into the swimming pool, the temperature of the water decreases. As a result, the speed of sound will

A. increase.
B. decrease.
C. become zero.
D. remain the same.

41. The phenomenon of wave that distinguishes between transverse and longitudinal waves is

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

42. Which of the following is NOT the application of polarisation of light?

A. Photographers use filters to reduce the glare in order to get clear pictures.
B. Drivers use sunglasses that diminish the brightness of headlights of a car.
C. Astronomers use lenses in telescopes to enlarge the image of celestial bodies.
D. Fishermen use eye-wear which decreases the reflection of light from the water.

43. The optical media that is used to eliminate the glare of light produced by the road surface during driving is

A. sun screen.
B. convex lens.
C. plane mirror.
D. polaroid glass.

44. Colours seen from an oil film on water depends on the following factors EXCEPT

A. angle of view.
B. density of the oil.
C. index of refraction.
D. thickness of the film.

45. 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.

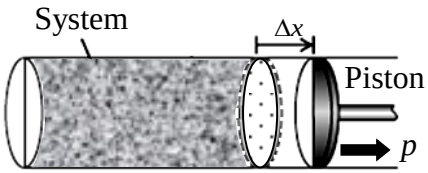
46. All Carnot engines have zero efficiency if they are operating between two bodies with

A. the same temperature and the same nature of the working substance.
B. different temperatures and the same nature of the working substance.
C. the same temperature irrespective of the nature of the working substance.
D. different temperatures irrespective of the nature of the working substance.

47. In a thermodynamic system, if there is no change in temperature and internal energy, then the process is called an

A. isobaric process.
B. adiabatic process.
C. isochoric process.
D. isothermal process.

48. The given figure shows a cylinder containing fluid with a movable piston.



If the piston moves out a small distance Δx, then the work done by the gas is

A. $-p\Delta x$
B. $-pA\Delta x$
C. $p\Delta x$
D. $pA\Delta x$

49. In thermodynamics, when any two objects are rubbed together, then their internal energy will

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

50. All of the following are the examples of reversible process EXCEPT

A. boiling of raw eggs.
B. compression of a helical spring.
C. slow compression of oxygen gas.
D. freezing of a carbonated drink into ice.

END OF PAPER

Please use this page for rough work