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# **PHYSICS PAPER-I**

**Annual Examination 2021**

**Max.Marks:40**    **SECTION A (MULTIPLE CHOICE QUESTIONS) – (M.C.Qs.)**    **Time: 40 min**

**1. Select the most appropriate answer for each from the given options:**

The horizontal range of a projectile depends upon:

- \* The angle of projection
- \* 'g' at the place
- \* The velocity of the projectile
- \* All of them

viii) While passing through its equilibrium position the speed of body executing SHM becomes:

- \* Zero
- \* One third
- \* Maximum
- \* Minimum

ix) The rate of change of angular momentum with respect to time is:

- \* Force
- \* Angular acceleration
- \* Angular velocity
- \* Torque

x) The laws of motion in the presence of constant acceleration are given by:

- \* Galileo
- \* Hertz
- \* Newton
- \* Kepler

xi) The rate of doing work is zero when the angle between force and velocity is:

- \*  $0^\circ$
- \*  $180^\circ$
- \*  $45^\circ$
- \*  $90^\circ$

xii) least distance of distinct vision

- \* increases with increase in age
- \* decreases with increase in age
- \* neither increases nor decreases
- \* becomes infinite after 60 years

xiii) In young's double-slit experiment, the condition for the constructive interference is that the path difference must be:

- \* An odd multiple of the half wavelength
- \* An integral multiple of the wavelength
- \* An odd multiple of the whole wavelength
- \* An even number of the wavelength

xiv) The length of Astronomical telescope is equal to:

- \*  $f_o/f_e$
- \*  $f_o - f_e$
- \*  $f_e - f_o$
- \*  $f_o + f_e$

xv) A vector which can be displaced parallel to its self and applied at any point is known as a:

- \* Parallel vector
- \* Free Vector
- \* Unit vector
- \* Zero vector

xvi) When a vector is multiplied by a negative number its direction:

- \* Remains the same
- \* Changes
- \* Becomes opposite
- \* Zero

xvii) Maximum number of rectangular components are.

- \* One
- \* Two
- \* Three
- \* Four

xviii) A body is moving with uniform velocity. Its,

- \* Speed changes
- \* Direction of motion changes
- \* Acceleration changes
- \* Displacement from origin changes

xix) During long jump, athlete runs before taking the jump. By doing so he.

- \* Provide him a larger inertia
- \* Decrease his inertia
- \* Decrease his momentum
- \* Increase his momentum

xx) If force of friction is negligible, then acceleration of two free falling objects of different Masses is

- \* The same
- \* Different
- \* Smaller mass has smaller acceleration
- \* None of these

- xxi) The angle of projection for which the horizontal range and maximum height becomes equal is  
 \*  $\tan^{-1} 1/4$  \*  $\tan^{-1} 1/2$  \*  $\tan^{-1} 4$  \*  $\tan^{-1} 2$
- xxii) The expression for centripetal acceleration is given as:  
 \*  $v/r$  \*  $r/v^2$  \*  $r^2\omega$  \*  $r\omega^2$
- xxiii) It is better to use long spanner rather than a short one when tighten a nut or a bolt because  
 \* Less force needs to be exerted by the user \* Less friction in present  
 \* Less tuning effects is required on the spanner \* At the surface of the body
- xxiv) A hole is drilled through the earth along the diameter and a stone is dropped into it. When the stone is at the centre of the earth it has \_\_\_\_\_.  
 \* Mass \* Weight \* Acceleration \* None of these
- xxv) If the radius of the earth were to shrink by 1% while its mass remaining same, the acceleration due to gravity on the earth surface would \_\_\_\_\_.  
 \* Decrease \* Remain the same \* Increase \* None of these
- xxvi) When a person goes down to the bottom of deep mine compared to his weight on the surface then its weight will \_\_\_\_\_.  
 \* Remain same \* Increase \* Decrease \* None of these
- xxvii) If the mass of the earth becomes four times large, the value of 'g' will:  
 \* Remains unchanged \* Becomes four times larger \* Be doubled \* Become 16 times larger
- xxviii) When a car accelerates up a hill slope it is said to be:  
 \* Loss of both P.E & K.E \* Gain of both P.E & K.E  
 \* Gain of P.E & Loss of K.E \* Gain of K.E & Loss of P.E
- xxix) Power is a:  
 \* Scalar Quantity \* Vector Quantity \* Sometimes scalar & sometimes vector  
 \* None of these
- xxx) Work energy equation is simply:  
 \* Law of conservation of mass \* Law of conservation of energy  
 \* Law of conservation of linear momentum \* None of them
- xxxi) A simple pendulum has metal bob which is negatively charged. If it is allowed to oscillate above a positively charged metallic plate then its period will:  
 \* Increase decrease \* Decrease \* Remain the same \* Becomes zero
- xxxii) Which one of the following properties of sound is affected by change in air temperature?  
 \* Frequency \* Amplitude \* Intensity \* Wavelength
- xxxiii) A pendulum clock is running slow, it can be corrected by making this pendulum:

- \* Longer      \* Shorter      \* Heavier      \* Lighter

xxxiv) According to Doppler's effect, the apparent frequency becomes \_\_\_\_\_ as compared with

actual frequency of sound when a listener moves towards the stationary source:

- \* Small      \* Large      \* Same      \* None of them

xxxv) Double slit arrangement is suggested by Young in order to obtain:

- \* Monochromatic light      \* Phase coherence  
\* Constructive interference      \* Destructive interference

xxxvi) The diffraction observed by diffraction grating can also be termed as:

- \* Single slit diffraction      \* Double slit Diffraction  
\* Multiple Slit Diffraction      \* Fresnel's Diffraction

xxxvii) Two sources of light are said to be coherent if \_\_\_\_\_.

- \* They produce waves of the same wave length      \* They have the same amplitude of vibration  
\* They produce waves in the medium simultaneously      \* They produce waves of the same amplitude

xxxviii) If we narrow the distance between two slits in Young's experiment the fringes width:

- \* Increases      \* Decreases      \* Remains same      \* Becomes zero

xxxix) The point to which the light rays are brought to focus is called:

- \* Principle Focus      \* Optical Axis      \* Centre of curvature      \* None of these

xxxx) If the magnification of the lens is 6 and the image distance is 24cm then the object distance is

- \* 2cm      \* 4cm      \* 6cm      \* 8 cm

Max.Marks:45

Time: 80minutes

### **SECTION "B" SHORT-ANSWER QUESTION (28MARKS)**

**NOTE:** Attempt any seven part questions from this section. All questions carry equal marks. The use of scientific calculator is allowed. All notations are used in their usual meanings. Draw diagram where necessary.

- Q 2 (i). Give the dimensions of the following quantities:  
(a) Torque      (b) Angular momentum      (c) Pressure      (d) K.E
- (ii) State and prove the law of Conservation of Linear Momentum.
- (iii) What is difference between static and dynamic equilibrium? State the conditions of equilibrium.
- (iv) Drive an expression for the Variation of "g" with depth
- (v) How is the magnifying power of the (i) Astronomical telescope and (ii) compound microscope affected by increasing the focal length of their objectives?
- (vi) Prove that the vectors  $A = 2i + j + k$        $B = 2i + j + 2k$       and       $C = i + j + k$  can form the sides of a right angled triangle.

- (vii) Two coherent sources are placed 1.8cm apart. Interference fringes are obtained on screen 80cm away. The fourth bright fringe is at a distance of 1.08 cm from the central fringe. Calculate the wavelength of the light used.
- (viii) A body of mass 'm' taken from earth surface to height 'h' and released. Derive a relation which shows that, Gain in K.E equals to difference in Loss of Potential Energy and Work done against friction.
- (ix) Find the speed of sound in air at  $50^{\circ}\text{C}$  and  $70^{\circ}\text{C}$  (take speed of sound 332 m/s).
- (x) A truck starts from rest at the top of a slope which is 1 m high and 49 m long. Find its acceleration and speed at the bottom of the slope assuming that friction is negligible
- (xi) Derive an expression for frequency heard by listener when the Source approaches to stationary listener.
- (xii) A diver leaps from a tower with an initial horizontal velocity component of 7 m/s and upward velocity component of 3 m/s. Find the component of her position after 1 second

### **SECTION "C" (DETAILED ANSWER QUESTIONS)** (17 Marks)

**NOTE:** Attempt any **One** question from this section. Draw diagrams, where necessary. The use of scientific calculator is allowed. All notations are used in their usual meanings.

- Q3) a. Discuss Distributive Law for Dot product. (05)
- b. What is Projectile motion? Derive the relation for.  
i) Total time of flight ii) Range of projectile. (06)
- c. Give Newton's formula for speed of sound. What corrections made by Laplace in it, Discuss. (06)
- Q4) a. What is an inclined plane? A block of mass 'm' is placed on an inclined surface; derive the relation for its acceleration when the block is sliding down in presence of friction. (06)
- b. What is diffraction grating? How can it be used to measure Wavelength of light? (05)
- c. With the help of ray diagram. Derive relation for magnifying power of compound microscope. (06)