

SWL-11-1-23

Roll No.

--	--	--	--	--	--

(To be filled in by the candidate)

Physics**H.S.S.C (11th) 1st Annual 2023**

Time : 20 Minutes

Paper : I

Group : I

Objective - (iv)

Marks : 17

Paper Code 6 4 7 7

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A**CANCELLED**

Q.1	Questions	A	B	C	D
1.	2° is equal to:	0.035 rad.	0.300 rad.	0.350 rad.	0.0035 rad.
2.	Which electromagnetic wave is used for the satellite communication system?	Radio waves	Infrared waves	Ultraviolet waves	Microwaves
3.	An electric motor produces a tension of 4500N in a load lifting cable and rolls it at the rate of $2ms^{-1}$. The power of the motor is:	4kW	2kW	15kW	9kW
4.	Acceleration of rocket is given by relation:	$a = \frac{M}{mv}$	$a = \frac{m}{Mv}$	$a = \frac{mv}{m}$	$a = \frac{mv}{M}$
5.	If $1\vec{a} + \vec{b} = 1\vec{a} - \vec{b}$ then angle between \vec{a} and \vec{b} is:	0°	45°	90°	180°
6.	Two forces of magnitudes 10N and 20N act on a body in directions making angles of 30° each with x-axis. The x-component of the resultant force will be:	25.98 N	30.98 N	20.98 N	17.98 N
7.	Speed of the earth around the sun in ms^{-1} is:	35500	20000	29600	50000
8.	Which pair of physical quantities have same dimensions?	Work and power	Momentum and impulse	Force and torque	Momentum and force
9.	Velocity of an object has 1% uncertainty and mass has 2% uncertainty then total uncertainty in K.E will be:	3%	2%	4%	1%
10.	Absolute zero corresponds to:	$-459^\circ F$	$-360^\circ F$	$0^\circ F$	$460^\circ F$
11.	The change in internal energy is defined as:	Q - T	Q + P	Q - P	Q - W
12.	The refractive index of water is 1.33 the speed of light in water is: ($c = 3 \times 10^8 m/sec$)	$3 \times 10^8 m/sec$	$1.8 \times 10^8 m/sec$	$2.3 \times 10^8 m/sec$	$1.3 \times 10^8 m/sec$
13.	In Michelson interferometer, to switch the fringes from bright to dark, the mirror should be displaced by:	$\frac{\lambda}{2}$	$\frac{\lambda}{3}$	$\frac{\lambda}{4}$	λ
14.	Speed of sound at $0^\circ C$ is $332 ms^{-1}$. The speed of sound at $30^\circ C$ will be:	332 m/sec	350 m/sec	340 m/sec	335 m/sec
15.	A block weighing 4.0 kg extends a spring by 0.16m from its unstretched position, stretching force is:	20.3 N	16.3 N	39.2 N	14.2 N
16.	A simple harmonic oscillator has a period of 0.01s and an amplitude of 0.2m. The magnitude of velocity at the centre of oscillation is:	20π	40π	60π	80π
17.	The dimensions of $\frac{1}{2} \rho v^2$ is same as that of:	K.E	P.E	Pressure	Work

Note: Section B is compulsory. Attempt any Three questions from Section C.

SECTION-B

2. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. Distinguish between base units and derived units.
- ii. What are random error and systematic error?
- iii. Write the dimensions of: (i) Pressure (ii) Power.
- iv. The period of a simple pendulum is measured by a stop watch. What type of errors are possible in the time period?
- v. Define: (i) Null vector (ii) Equal vectors.
- vi. Vector \vec{A} lies in the xy-plane. For what orientation will both of its rectangular components be negative? For what orientation will its components have opposite signs?
- vii. Can a vector have component greater than the vector's magnitude?
- viii. Water flows out from a pipe at 3kg s^{-1} and its velocity changes from 5ms^{-1} to zero on striking the wall. What will be the force exerted by water on the wall?
- ix. Derive formula for time of flight of projectile.
- x. What is the difference between elastic and inelastic collision?
- xi. What is the difference between uniform and variable velocity?
- xii. Two row boats moving parallel in the same direction are pulled towards each other. Explain.

3. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. A girl drops a cup from a certain height which breaks into pieces. Which energy changes are involved?
- ii. In which case more work is done? When a 50 kg bag of books is lifted through 50cm or when a 50 kg crate is pushed through 2m across a force of 50N?
- iii. Potential energy is the property of a conservative field. Explain.
- iv. What is geostationary satellite and geo-stationary radius?
- v. Show that orbital angular momentum $L_o = mvr$
- vi. What is meant by moment of inertia? Explain its significance.
- vii. If a mass spring system is hung vertically and set into oscillation, why does the motion eventually stop?
- viii. Show that when a pendulum moves from mean position to half of amplitude, time taken by it is $t = \frac{T}{12}$.
- ix. What is meant by phase angle?
- x. Explain 'red shift' and 'blue shift' in light.
- xi. Why does sound travel faster in solids than in gases?
- xii. How are beats useful in tuning musical instruments?

4. Write short answers to any Six parts.

(6 x 2 = 12)

- i. State Huygen's principle.
- ii. How would you manage more orders of spectra by using a diffraction grating?
- iii. How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
- iv. What is the least distance of distinct vision? Also, give the length of this distance.
- v. If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
- vi. What is the average translational K.E of molecules in a gas at temperature 27°C ?
- vii. How would you explain the sign convention of First Law of Thermodynamics?
- viii. Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero.
- ix. Why does the pressure of a gas in a car tyre increase when it is driven through some distance?

SECTION-C

(Note: Attempt any Three questions. Each question carries Eight (8) Marks)

(8x3=24)

5. (a) What is gravitational field? Show that gravitational field is a conservative field. (5)
- (b) Find the projection of vector $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of the vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$. (3)
6. (a) State and prove the law of conservation of linear momentum. (5)
- (b) A body of moment of inertia $I = 0.80\text{ kg m}^2$ about a fixed axis, rotate with a constant angular velocity of 100 rad s^{-1} . Calculate its angular momentum and the torque to sustain this motion. (3)
7. (a) State and prove Bernoulli's equation for an ideal fluid. (5)
- (b) A carnot engine whose low temperature reservoir is at 7°C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees the temperature of the source be increased? (3)
8. (a) Define simple harmonic motion. Discuss that energy is conserved for a body executing simple harmonic motion. (5)
- (b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C . (3)
9. (a) Describe how Michelson measured the speed of light? (5)
- (b) In a double slit experiment the second order maximum occurs at $\theta = 0.25^\circ$. The wavelength is 650 nm. Determine the slit separation. (3)

Physics

SWL-11-2-23

Roll No.

--	--	--	--	--	--

(To be filled in by the candidate)

H.S.S.C (11th) 1st Annual 2023

Time : 20 Minutes

Paper : I

Group : II

Objective - (ii)

Marks : 17

Paper Code

6	4	7	4
---	---	---	---

Note - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Putting or filling up two or more circles will result no mark.

SECTION-A

CANCELLED

Q.1	Questions	A	B	C	D
1.	If a gymnast sitting on a stool with his arm stretched, lowers his arms:	ω decreases	ω increases	I increases	ω remains same
2.	Angular momentum has the same unit as:	Impulse \times Distance	Power \times Time	Linear momentum	Work \times Frequency
3.	Which of the given variable is present in all equations of motion:	Distance	Acceleration	Time	Torque
4.	At what speed, the momentum and kinetic energy of a body have the same value:	1ms^{-1}	2ms^{-1}	4ms^{-1}	8ms^{-1}
5.	The earth receives larger amount of energy from:	Wind	Water	Sun	Moon
6.	Product $\hat{i} \times (\hat{j} \times \hat{k})$ is equal to:	1	$\vec{0}$	\hat{j}	\hat{i}
7.	Projection of \vec{A} on \vec{B} is:	$A \cos \theta$	$B \sin \theta$	$B \tan \theta$	$A \sin \theta$
8.	Absolute uncertainty in a measuring instrument is equal to:	Least count	Accuracy	Fractional uncertainty	Percentage uncertainty
9.	The dimensional formula for the quantity light year is:	[T]	[L]	[LT ⁻¹]	[M ⁰ LT]
10.	No entropy change takes place in:	Isobaric process	Isothermal process	Adiabatic process	Isochoric process
11.	If heat is added to a system, then its entropy will:	Increase and positive	Decrease and positive	Increase but negative	Decrease but negative
12.	Information carrying capacity of an optical fibre is called:	Capacity	Band width	Immunity	Ability
13.	Newton's rings are formed due to:	Diffraction	Refraction	Reflection	Interference
14.	Beats can be heard when difference of frequency is not more than:	4 Hz	6 Hz	8 Hz	10 Hz
15.	With the increase of temperature, speed of sound:	Remains same	Becomes zero	Decreases	Increases
16.	Which expression is correct for time period of simple pendulum?	$T \propto l$	$T \propto \sqrt{l}$	$T \propto m$	$T \propto g$
17.	The working of carburetor of car uses:	Equation of continuity	Gravitational law	Stoke's law	Bernoulli's theorem

Physics

SWL-11-2-23

Roll No.

--	--	--	--	--	--	--	--

(To be filled in by the candidate)

H.S.S.C (11th) 1st Annual 2023

Time : 2:40 Hours

Paper : I

Group : II

Subjective

Marks : 68

Note: Section B is compulsory. Attempt any 3 questions from Section C.

SECTION-B

2. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. Show that $E=mc^2$ is dimensionally consistent.
- ii. The time of 30 vibrations of a simple pendulum recorded by a stop watch accurate up to one tenth of a second is 54.6 s. Find its period with uncertainty.
- iii. Give the drawbacks to use the period of a pendulum as a time standard.
- iv. What is the difference between kilogram and mole?
- v. Can the product of two vectors be equal to the product of their magnitudes?
- vi. Define the terms (i) unit vector and (ii) components of a vector.
- vii. If $\vec{A} + \vec{B} = \vec{O}$, what can you say about the components of the two vectors?
- viii. Define impulse and write its units.
- ix. Show that the range of projectile is maximum when projectile is thrown at an angle of 45° with the horizontal.
- x. Can the velocity of an object reverse the direction when acceleration is constant? If so give an example.
- xi. Derive the relation for the time of flight of a projectile.
- xii. Explain, how the swing is produced in a fast moving cricket ball.

3. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. A boy uses a catapult to throw a stone which accidentally smashes a greenhouse window. List the possible energy changes.
- ii. An object has 1 J of potential energy. Explain what does it mean?
- iii. What do you know about geothermal energy?
- iv. Why does a diver change his body positions before and after diving in the pool?
- v. Show that orbital angular momentum $L_o = mvr$.
- vi. What is INTELSAT VI?
- vii. If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
- viii. What is meant by phase angle? Does it define angle between maximum displacement and the driving force?
- ix. Define restoring force. What are its units?
- x. How should a sound source move with respect to an observer so that the frequency of its sound does not change?
- xi. Why does sound travel faster in solids than in gases?
- xii. How are beats useful in tuning musical instruments?

4. Write short answers to any Six parts.

(6 x 2 = 12)

- i. In Young's experiment, one of the slits is covered with blue filter and other with red filter. What would be the pattern of light intensity on the screen?
- ii. How would you distinguish between un-polarized and plane-polarized lights?
- iii. Give two uses of Michelson's interferometer.
- iv. If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
- v. What is spectrometer? Write down its two main parts.
- vi. Given an example of a natural process that involves an increase in entropy.
- vii. What happens to the temperature of a room, when an air conditioner is left running on a table in the middle of the room?
- viii. Define Iso-thermal process and write its relation.
- ix. In which process external work is done at the expense of the internal energy of the gas molecules? Explain it.

SECTION-C

(Note: Attempt any Three questions. Each question carries Eight (8) Marks)

(8x3=24)

5. (a) Define gravitational field. Show that work done in gravitational field is independent of path followed. 5
(b) Two forces of magnitude 10 N and 20 N act on a body in directions making angles 30° and 60° respectively with x-axis. Find the resultant force. 3
6. (a) What is projectile and projectile motion? Explain and analyse the oblique projectile as well as horizontal projectile. 5
(b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the highest point. 3
7. (a) Show that pressure exerted by the gas molecules is directly proportional to average translational kinetic energy of the gas molecules. 5
(b) Water flows through a hose, whose internal diameter is 1 cm at a speed of 1 ms^{-1} . What should be the diameter of the nozzle if water is to emerge at 21 ms^{-1} ? 3
8. (a) What is the main purpose of resonance? Explain it with an experiment of pendulums of different lengths. Also, give one example of resonance. 5
(b) A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four segments at a frequency of 120 Hz. Determine its wavelength and the fundamental frequency? 3
9. (a) What is a compound microscope? Describe its construction and working. Also calculate its magnifying power. 5
(b) A light is incident normally on a grating which has 2500 lines per centimetre. Compute the wavelength of a spectral line for which the deviation in second order is 15.0° . 3

JH = Cur

Roll No.

(To be filled in by the candidate)

Physics

H.S.S.C (11th)-A-2022

Time : 20 Minutes

Paper : I Group : I

Objective – (i)

Marks : 17

PX-1A¹ **Sewl-61-22** Paper Code **6 4 7 1**

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

Q.1	Questions	A	B	C	D
1.	The time taken by light from moon to earth is:	1 min. 10 sec	1 min 20 sec	1 min 30 sec	1 min 40 sec
2.	If $r = 2.25 \pm 0.01$ cm then %age uncertainty in 'r' is:	0.2%	0.3%	0.4%	0.5%
3.	Magnitude of resultant vector of 6N and 8N which is perpendicular to each other is:	2 N	14 N	48 N	10 N
4.	The dimensions of torque are:	$[MLT^{-2}]$	$[ML^2T^{-2}]$	$[ML^{-1}T^{-2}]$	$[ML^{-1}T^{-1}]$
5.	When velocity time graph is parallel to time axis, then acceleration of moving body is:	Negative	Positive	Maximum	Zero
6.	The range of projectile is same for angles:	$15^\circ, 55^\circ$	$30^\circ, 50^\circ$	$35^\circ, 55^\circ$	$40^\circ, 60^\circ$
7.	The dimension of kinetic energy is similar to that of:	Power	Torque	Momentum	Pressure
8.	Centripetal force performs:	Minimum work	Maximum work	Negative work	No work
9.	30° is equal to:	$\frac{\pi}{2}$ radian	$\frac{\pi}{4}$ radian	$\frac{\pi}{6}$ radian	$\frac{\pi}{8}$ radian
10.	As the water falls from a top, its cross-sectional area should decrease according to:	Bernoulli's equation	Continuity equation	Venturi relation	Torricelli's theorem
11.	$\sqrt{\frac{m}{k}}$ and $\sqrt{\frac{l}{g}}$ has same:	Units	Time period	Numerical value	Damping
12.	If 20 waves pass through a medium in 1 Sec. with speed of 20 m/s then the wavelength is:	1 m	20 m	40 m	400 m
13.	The velocity of sound in vacuum at $0^\circ C$ is:	280 m/s	332 m/s	335 m/s	Zero
14.	The wavelength of x-rays is of the order of:	10 cm	10 m	10^{10} m	10^{-10} m
15.	The detector in photo-diode is made of:	Germanium	Selenium	Cadmium	Silicon
16.	If the temperature of sink is absolute zero, then efficiency of heat engine will be:	Zero	50 %	100 %	Infinity
17.	No entropy change takes place in:	Isothermal process	Isochoric process	Isobaric process	Adiabatic process

JH = Cu

Roll No.

--	--	--	--	--	--

 (To be filled in by the candidate)

Physics

H.S.S.C (11th)-A-2022

Time : 2:40 Hours

Paper : I

Group : I

Subjective

Sub-91-22

Marks : 68

Note: Section B is compulsory. Attempt any 3 questions from Section C.

SECTION-B

2. Write short answers to any Eight parts. (8 x 2 = 16)
- Give the drawbacks to use the period of pendulum as time standard.
 - Write the dimension of (i) Pressure (ii) Density
 - Explain circumstances in which the velocity \vec{v} and acceleration \vec{a} of a car are (i) anti-parallel (ii) $V = 0$ but $a \neq 0$
 - Differentiate between uniform velocity and variable velocity. Give units.
 - Why does the pressure of a gas in a car tyre increases when it is driven through some distance?
 - Is it possible to convert internal energy into mechanical energy? Give example.
 - How many seconds are there in one year?
 - What are the dimension and unit of $\left[\frac{F \times l}{m}\right]^{1/2}$?
 - Why First Law of Motion also called Law of inertia?
 - Differentiate between elastic and in-elastic collision.
 - Give three postulates of kinetic theory of gases.
 - Define isothermal process.
3. Write short answers to any Eight parts. (8 x 2 = 16)
- How a vector is determined when its rectangular components are given?
 - Find the projection of $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of $\vec{B} = 3\hat{i} - \hat{j} - 12\hat{k}$
 - Can a body rotate about its centre of gravity under the action of its weight?
 - Define variable force and conservative field.
 - A body of mass 2Kg is dropped from a height of 10m, find its velocity just before striking the ground (ignoring friction)
 - Calculate the work done in kilo Joules in lifting a mass of 10 Kg (at a steady velocity) through a vertical height of 10m.
 - When mud flies off the tyre of a moving bicycle, in what direction does it fly?
 - What is meant by moment of inertia? Explain its significance.
 - Show that $V = r\omega$
 - An oil film spreading over a wet foot path shows colours. Explain how does this happen?
 - Write the conditions for detectable interference of light.
 - Name the various methods for obtaining the polarized light.
4. Write short answers to any Six parts. (6 x 2 = 12)
- Two row boats moving parallel in the same direction are pulled toward each other. Explain.
 - Show that in SHM the acceleration is zero when the velocity is greatest and the velocity is zero when the acceleration is greatest.
 - Can we realize an ideal simple pendulum?
 - What is damping? Where it is useful?
 - It is possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?
 - Explain why sound travels faster in warm air than in cold air.
 - Explain reflection of waves.
 - Explain the difference between angular magnification and resolving power of an optical instrument.
 - What is critical angle? Explain by ray diagram.

SECTION-C

(Each question carries Eight (8) Marks)

5. (a) Define Absolute Gravitational P.E. Show that absolute gravitational P.E of an object at the earth surface is 5
$$U = -G \frac{mM}{R}$$
- (b) A force $\vec{F} = 2\hat{i} + 3\hat{j}$ units, has its point of application moved from point A(1,3) to the point B(5,7). Find the work done. 3
6. (a) What is Artificial Gravity? Derive an expression for frequency of spaceship to provide artificial gravity. 5
(b) Two masses 'm₁' and 'm₂' are initially at rest with a spring compressed between them. What will be the ratio of the magnitude of their velocities after the spring has been released? 3
7. (a) State and prove Bernoulli's Equation in dynamic fluid. 5
(b) A church organ consists of pipes, each with open at one end, of different lengths. The minimum length is 30mm and the largest is 4m. Calculate the frequency range of the fundamental notes. 3
8. (a) Derive a relation for the time period of a simple pendulum. 5
(b) A light is incident normally on a grating which has 2500 lines per centimetre. Compute the wavelength of a spectral line for which the deviation in second order is 15.0°. 3
9. (a) What is meant by Carnot Cycle and Carnot Engine? Calculate efficiency of an ideal Carnot engine and discuss 5 parameters on which it depends.
(b) An astronomical telescope having magnifying power 5 consists of two thin lenses 24 cm apart. Find focal lengths of 3 the lenses.

J.P. = C

Roll No.

(To be filled in by the candidate)

Physics

H.S.S.C (11th)-A-2022

Time : 20 Minutes

Paper : I

Group : II

Objective – (ii)

Marks : 17

PX-1A/ SWL-92-22 Paper Code

6	4	7	4
---	---	---	---

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

Q.1	Questions	A	B	C	D
1.	Longitudinal waves do not exhibit:	Reflection	Refraction	Diffraction	Polarization
2.	Young's double slit experiment is used to study the interference of:	Light waves	Micro waves	Sound waves	Radio waves
3.	The image formed by eyepiece of compound microscope is:	Real and magnified	Real and diminished	Virtual and enlarged	Virtual and diminished
4.	Absolute uncertainty in a measuring instrument is equal to:	Least Count	Accuracy	Fractional uncertainty	Percentage uncertainty
5.	The numerical values of constants in any formula cannot be determined by dimensional analysis, however it can be found by:	Addition	Physical quantities	Experiments	Uncertainty
6.	Torque acting on a body determines its:	Linear acceleration	Impulse	Angular acceleration	Linear momentum
7.	The vector product ($\vec{A} \times \vec{A}$) is equal to:	0	1	A ²	0
8.	According to first law of thermodynamics, the quantity which is conserved:	Force	Momentum	Power	Energy
9.	For an ideal gas system, the internal energy is directly proportional to:	Pressure	Volume	Mass	Temperature
10.	10 N centripetal force is revolving along a circular path of radius 1m, the work done by this force is:	10 Joules	20 Joules	40 Joules	Zero Joule
11.	Terminal velocity V_t is related with radius 'r' of a spherical object as:	$V_t \propto r^2$	$V_t \propto r$	$V_t \propto \frac{1}{r}$	$V_t \propto \frac{1}{r^2}$
12.	When a particle is moving in a circular path, its projection along diameter executes?	Linear motion	Simple harmonic motion	Circular motion	Perpetual motion
13.	Phase angle of 180° is equal to a path difference of:	$\frac{\lambda}{2}$	$\frac{\lambda}{4}$	2λ	λ
14.	Motion of a body along y-axis is:	One dimensional	Two dimensional	Three dimensional	Four dimensional
15.	If the mass of the body is doubled, then acceleration will become:	Double	Half	One fourth	Constant
16.	Kilowatt-hour is unit of:	Power	Energy	Impulse	Momentum
17.	Centripetal force is directed along:	Tangent to circle	Radius	Axis of rotation	z-axis

JH = Cu

Roll No. (To be filled in by the candidate)

Physics

H.S.S.C (11th)-A-2022

Time : 2:40 Hours

Paper : I

Group : II

Subjective

501-62-72

Marks : 68

Note: Section B is compulsory. Attempt any 3 questions from Section C.

SECTION-B

2. Write short answers to any Eight parts. (8 x 2 = 16)
- Give the drawbacks to use the time period of a simple pendulum as a time standard.
 - Is Zero Significant or not? Explain.
 - Check the correctness of relation dimensionally $E = hf$, where $E =$ energy, $f =$ frequency and $h =$ plank, s constant.
 - Does the dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression?
 - Can velocity of an object reverse the direction when acceleration is constant? If so, give an example.
 - Derive the formula for time to reach the maximum height by the projectile.
 - Define an isolated system. Give its example. Is ideal isolated system possible?
 - Show that the range of a projectile is maximum when it is thrown at an angle of 45° with horizontal.
 - State Second Law of Thermodynamics.
 - Derive Boyle's law and Charle's law on the basis of kinetic molecular theory of gasses.
 - Is it possible to convert internal energy into mechanical energy? Explain.
 - Give an example of natural process that involves an increase in the entropy.
3. Write short answers to any Eight parts. (8 x 2 = 16)
- How would you distinguish between unpolarized and plane-polarized lights?
 - Under what conditions two or more sources of light behave as coherent sources?
 - Clearly differentiate between plane and spherical wavefronts.
 - Why does a diver change his body positions before and after diving in the pool?
 - Show that orbital angular momentum $L_o = mvr$.
 - Calculate the moment of inertia of a sphere of radius 0.5m and mass 10kg.
 - What sort of energy is in the given: (i) Compressed spring (ii) A moving car
 - Show that $P = \overline{F \cdot \overline{V}}$
 - What is meant by non-conventional energy sources? Give two examples.
 - Can a body rotate about its centre of gravity under the action of its weight?
 - What is meant by static and dynamic equilibrium?
 - Why the magnitude of a vector can not have negative value? Explain.
4. Write short answers to any Six parts. (6 x 2 = 12)
- Distinguish between Laminar and Turbulent flow of fluid.
 - Find the frequency of Simple Pendulum whose length is 0.25m at $g = 9.8ms^{-2}$
 - Does frequency depend on amplitude for harmonic oscillator?
 - Show that in SHM the acceleration is zero when velocity is greatest.
 - What is time period of 250 cycles per second of sound waves?
 - Explain, why sound travels faster in warm air than in cold air?
 - What features do longitudinal waves have in common with transverse waves?
 - What do you understand by linear magnification and angular magnification? Explain how a convex lens is used as magnifier.
 - A person was looking through a telescope at the full moon. How would the appearance of the moon be changed by covering half of the objective lens?

SECTION-C

(Each question carries Eight (8) Marks)

- (a) How would you determine the equations of magnitude and direction of a vector in vector addition by rectangular components? Also give five steps of addition. 5
- (b) Ten bricks, each 6.0 cm thick and mass 1.5 kg, lie flat on a table. How much work is required to stack them one on one the top of another? 3
- (a) What is isolated system? State and explain Law of Conservation of Angular Momentum? 5
- (b) A gramophone record turntable from rest to an angular velocity of 45.0 rev/min in 1.60 s. What is the average angular acceleration? 3
- (a) State and prove Bernoulli's equation for an ideal fluid. 5
- (b) A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120 Hz. Determine its wavelength and fundamental frequency. 3
- (a) Define simple harmonic motion. Prove that energy is conserved for a body executing simple harmonic motion. 5
- (b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wave length of a spectral line for which the deviation in second order is 15.0° . 3
- (a) State First Law of Thermodynamics and discuss the law for isothermal and adiabatic processes. 5
- (b) A glass light pipe in air will totally internally reflect a light ray if its angle of incidence is at least 39° . What is the minimum angle for total internal reflection if pipe is in water? (Refractive index of water = 1.33) 3

Physics

Paper : I

Roll No.

Inter (Part-I)-A-2021

(To be filled in by the candidate)

Time : 20 Minutes

Marks : 17

Objective - (III)

Paper Code 6 4 7 5

SWL-21

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

Q.1	Questions	A	B	C	D
1.	The term " ρgh " in Bernoulli's equation has the same units as:	work	energy	pressure	flow rate
2.	An ideal gas performs 10J of work while expanding adiabatically. The change in its internal energy is:	10J	-10J	100J	-200J
3.	Average translational K.E. of a gas molecule is:	$\frac{3}{2}KT$	$\frac{1}{2}KT$	$\frac{2}{3}KT$	KT
4.	The K.E of an object of mass " m " is " E ", its momentum will be:	$2Em$	$\sqrt{\frac{2E}{m}}$	$\sqrt{\frac{1}{2}Em}$	$\sqrt{2mE}$
5.	The frequency of waves produced in microwave oven is:	1435 MHz	2850 MHz	2450 MHz	4250 MHz
6.	The increase in velocity of sound in air for 1°C rise in temperature is:	61 cm/s	0.61 cm/s	61 m/s	1.61 m/s
7.	The ratio of velocity of disc to velocity of hoop is:	$\frac{2}{\sqrt{3}}$	$\frac{4}{\sqrt{3}}$	$\frac{2}{3}$	$\frac{4}{3}$
8.	The wave length of nth mode of stationary waves in closed pipe is:	$\frac{2l}{n}$	$\frac{4l}{2n-1}$	$\frac{4l}{n}$	$\frac{4l}{2n+1}$
9.	1 rev /min is equal to:	$\frac{\pi}{6}$ rad /s	$\frac{\pi}{30}$ rad /s	$\frac{\pi}{15}$ rad /s	2π rad /s
10.	If initial velocity of projectile becomes doubled. The time of flight will become:	4 times	Half	2 times	8 times
11.	Height of projectile is maximum at an angle of projection of:	45°	60°	30°	90°
12.	$\hat{i} \cdot (\hat{k} \times \hat{i}) =$	1	\hat{j}	\hat{i}	0
13.	If two non-zero vectors \vec{A} & \vec{B} are parallel to each other then:	$\vec{A} \cdot \vec{B} = 0$	$ \vec{A} \times \vec{B} = AB$	$\vec{A} \cdot \vec{B} = AB$	$\vec{A} \cdot \vec{B} = 1$
14.	The uncertainty in the time period of a vibrating body is:	least count \times No. of vibrations	least count + No. of vibrations	least count + No. of vibrations	least count - No. of vibrations
15.	Which pair of physical quantities have same dimensions?	work and power	momentum and impulse	force and torque	momentum and force
16.	Refractive index of water is:	1.5	1.33	1.0	1.2
17.	The fringe spacing is the greatest for:	Blue light	Yellow light	Green light	Red light

Roll No.

--	--	--	--	--	--

 (To be filled in by the candi

Physics

Inter (Part-I)-A-2021

Time : 2:40 Hours

Paper : I

SWL-21

Subjective

Marks : 68

Note: Section I is compulsory. Attempt any 3 questions from Section II.

(SECTION-I)

2. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. Check the correctness of the relation $v = \sqrt{\frac{F \times l}{m}}$ where v is the speed of transverse wave on a stretched string of tensile length l and mass m .
- ii. Does a dimensional analysis give any information on constant of proportionality that may appear in an algebra expression? Explain.
- iii. Add the following masses given in Kg upto appropriate precision. 2.189, 0.089, 11.8 and 5.32.
- iv. The volume of sphere $V=47.689 \text{ cm}^3$ with 1.2% uncertainty. What is the correct range of volume measurement?
- v. Suppose the sides of closed polygon represent vector arranged head to tail. What is the sum of these vectors?
- vi. Prove that $A \cdot B = A_x B_x + A_y B_y + A_z B_z$.
- vii. If all the components of vectors A_1 and A_2 were reversed, how would this alter $A_1 \times A_2$?
- viii. Define Law of Conservation of linear momentum and write its mathematical form.
- ix. Explain the difference between elastic and inelastic collisions. Explain how would a bouncing ball behave in each case? Give plausible reasons for the fact that K.E. is not conserved in most cases.
- x. Derive an expression for the time of flight of projectile.
- xi. What happens to the velocities of two bodies after collision when a light body collides with a massive body at rest for elastic collision?
- xii. Two row boats moving parallel in the same direction are pulled towards each other. Explain.

3. Write short answers to any Eight parts.

(8 x 2 = 16)

- i. A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?
- ii. Show that $1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$
- iii. What do you mean by variable force? Give its two examples.
- iv. Show that $v = r\omega$
- v. What is meant by moment of inertia? Explain its significance.
- vi. When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- vii. What is meant by phase angle? Does it define angle between maximum displacement and driving force?
- viii. Define resonance, write one advantage and one disadvantage of resonance.
- ix. Differentiate between free and forced oscillations.
- x. Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?
- xi. How temperature and density of the medium effect the speed of sound?
- xii. What happens when a jet plane like Concorde flies faster than the speed of sound?

4. Write short answers to any Six parts.

(6 x 2 = 12)

- i. How is the distance between interference fringes affected by separation between the slits of Young's experiment? Can fringes disappear?
- ii. How would you manage to get more orders of spectra using diffraction grating?
- iii. What are Newton's rings? How they are formed?
- iv. Explain the difference between angular magnification and resolving power of an optical instrument.
- v. What is meant by least distance of distinct vision?
- vi. Why does the pressure of a gas in a car tyre increases when it is driven through some distance?
- vii. What is meant by reversible process? Give its example.
- viii. Write down the postulates of kinetic theory of gases.
- ix. Specific heat of a gas at constant pressure greater than specific heat at constant volume. Why?

(SECTION-II)

(Each question carries Eight (5+3=8) Marks)

5. (a) Describe the method of addition of vectors by rectangular components.
(b) A truck weighing 2500 Kg and moving with a velocity of 21 ms^{-1} collides with stationary car weighing 1000 kg. The truck and the car move together after the impact. Calculate their common velocity.
6. (a) Define Absolute Potential Energy. Derive relation for absolute P.E of body of mass "m" at distance "r" from the center of earth.
(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C .
7. (a) State and prove Bernoulli's equation.
(b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the highest point.
8. (a) State first law of thermodynamics and explain: (i) Isothermal Process (ii) Adiabatic Process
(b) A simple pendulum is 50cm long. What will be its frequency of vibration at a place where $g = 9.8 \text{ ms}^{-2}$?
9. (a) Calculate the speed of light by Michelson's method.
(b) Yellow sodium light of wavelength 589 nm, emitted by a single source passes through two narrow slits 1.0 mm apart. The interference pattern is observed on a screen 225 cm away. How far apart are two adjacent bright fringes?

210-321-A-38000